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REVIEW OF THE PRINCIPLES OF SANITARY PLUMBING AS NOW ACCEPTED BY ALL LEADING SANITARIANS.

THE main object to be attained is the complete removal of waste matters from the premises the instant they are generated. This can only be accomplished by observing the following rules:—(1.) Avoid all cesspools. (2.) Make all waste-passages as small as possible to effect their purposes. (3.) Construct every fixture on the principle of the flush-tank. (4.) Make every trap seal-retaining and self-scouring. (5.) Make all joints tight. (6.) Select the simplest appliances and the simplest system consistent with safety. These rules are self-evident enough to be accepted as plumbing axioms, and are sufficient to produce perfect work. The "Sanitas" Appliances have been constructed with a view to their fulfilment in every respect, and an examination of the steps leading to the development of these appliances will best illustrate the principles of Sanitary Plumbing, showing the faults which should be avoided, and the objects which should be sought.

Beginning with the trap: In the first place mechanical seals have been discarded as being unreliable, unnecessary, and as obstructing the water-way. We start with the simplest form of water-seal trap, the ordinary S-trap. This

trap answers all our requirements except that it has no power to retain its seal under the variations of atmospheric pressure occuring within the waste-pipes. To remedy this deficiency the pot-trap was developed from the S-trap by simply enlarging its upcast limb, a sufficient enlargement gives it a temporary power of resistance, but creates a cesspool having no self-cleansing power and, accordingly, the trap clogs, under sinks, with

grease and ultimately loses its original resisting power. To avoid this difficulty we have turned the pot-trap on its side and reduced the size of its body. This permits the air to pass through the trap above the water without driving the latter out before it, as would be the case with a

perpendicular body equally reduced in diameter. To still further increase the power of resistance to siphonage the body was next bent into a quadrangle, giving several reflecting surfaces, which throw back this water under siphoning action while they allow the air to escape, and, finally, the two parallel sides of the quadrangle were merged into a single body having a reflecting partition and a large clean-out cap. This gives us the perfected Sanitas-Trap, which

has proved itself to be both anti-siphonic in properly arranged plumbing-work and substantially self-cleansing either with or without venting. It is more resisting than a vented S-trap.

The Sanitas is a Scientific System of Plumbing, having Simplicity and Safety for its Basis. It is also by far the most Economical System

SANITAS

APPLIANCES

PLUMBING

Avoid Infringements and Imitations which are described as being "as good as the 'Sanitas;'" they are not, they are very inferior as well as illegal.

Considering next the Lavatory. These should always be constructed on the principle of the flush-tank, their discharges filling the water-passages "full-bore," so as to keep them clean. The overflow and outlet passages should be combined in the form of a stand-pipe, thus doing away with the usual foul, inaccessible and badly jointed lead overflow-pipe, and the troublesome and dirty plug and chain. The stand-pipe should be operated by a simple mechanism above the slab, for convenience and cleanliness, requiring but a single movement of the hand, and all parts should be of solid and durable construction, while the stand-pipe should be easily detachable for cleansing. The Sanitas Lavatories are all constructed after this principle, and they are the first ever so constructed. The stand-pipes are made of either plated metal or of earthenware, like the fixture itself, and the whole device produces a very ornamental effect, especially when decorated in colors to correspond with the decoration of the earthenware bowl. Finally, the ideal water-closet should have the simplicity of the short-hopper, with the sanitary advantages and convenience of the improved modern closets. More than this, it should be practically noiseless, anti-siphonic, quick-acting, self-sealing, and free from spattering or waste of water. These desiderata have been attained in the Sanitas Water-Closet of which we sketch the outline in section. The supply-pipe between the cistern and the closet discharges into the latter below the level of its standing water, and being without air-pipe, stands permanently full of water, hence the action is instantaneous and the noise of flushing is deadened. This and the peculiar construction of the flushing-rim and water-supply passages cause the waste to be discharged with wonderful speed and effectiveness; and at the same time so quietly that with the cover down and the toilet-room door closed, no sound of flushing can be heard from without. The closet is highly ornamental in appearance, hence no other wood-work is required than the seat and cover, and these may be supported directly on the earthenware itself, which is constructed with this in view. The Sanitas System, taken together, is the most economical as well as the only safe system of plumbing, as avoiding the dangers and complication of special trap venting. Whether vented or not it is now admitted that safety requires a trap to be *anti-siphonic*, the vent-pipe alone not being reliable. The Sanitas Trap holds sufficient water to resist, when properly set, any *back pressure* that can occur in good plumbing with properly vented soil-pipes. For more detailed description and illustration of the Sanitas Appliances, see our other Advertisements and the Circulars of

THE SANITAS MANUFACTURING CO., BOSTON.

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THE New York *Star* gives an amusing description of the moving of the Brighton Beach Hotel, at Coney Island, perhaps the largest building that was ever moved in one piece, even in this country of migratory houses. The hotel, which is a wooden structure, very nearly five hundred feet long, and four stories high, was attacked last winter by a severe storm, which washed away the sand around it, leaving it standing in the water, and in imminent danger of destruction in case of exposure to another storm. It was therefore decided to move it bodily inland, as soon as the weather should permit, and last week the operation was successfully performed, under the direction of Mr. D. C. Miller, of New York. The first step was to shut out the water by a coffer-dam of sheet-piling. A forest of jack-screws was then inserted carefully under the building, and the whole mass slowly raised about eight feet, and securely blocked. Next, twenty-four lines of railroad track were constructed, running beneath the building, and extending in the direction of its proposed movement. After these had been firmly laid, levelled and ballasted, twenty-four trains, comprising one hundred and twelve flat-cars, were run under the hotel by a spur-track from the neighboring line, and heavy timbers were placed across from car to car, so as to form a platform capable of sustaining the building. When all was ready, the jack-screws were slacked, the mass lowered upon the platform, and the blocks taken away. All was then ready for the journey. The motive power consisted of six engines, attached to ropes, with sheaves which multiplied the force of each about eight times. Naturally, some anxiety was felt lest the locomotives should not start together, the consequence of which would be the serious straining of the structure, but by judicious signalling, and careful management of the ropes, the movement was made quite uniform, and it was transported with perfect success some two hundred feet inland, towards a new position out of reach of the sea. So gentle was the movement, and so slight the strain, that neither plastering nor window-glass was cracked, and the furniture, even to the crockery, kept its place without harm. The whole distance to be traversed is about six hundred feet, but as the new foundations are not quite ready, the latter part of the trip will be delayed a few days.

THE death of Mrs. Lucy Myers Mitchell ought not to pass unnoticed by any journal which interests itself in the fine arts. Mrs. Mitchell was born in Persia, where her father, the Rev. Austin H. Wright, was missionary to the Nestorians. She was sent to the United States to be educated, returning to Persia only for a year's visit when a school-girl of nineteen. In 1867 she was married to an artist of Morristown, N. J., Mr. S. S. Mitchell. The greater part of her married life was spent in Europe, and at Leipsic she became interested in Classic archæology and devoted herself to the study of this subject in Berlin, London and Rome. Her first notable publication was a series of articles on Greek sculpture in the *Century Magazine*, which attracted great attention, and soon afterwards she published in New York a very valuable "*History of Ancient Sculpture*," which won for her the distinction of membership in the Imperial Archæological Institute of Germany. While engaged in the collection of materials for a second book, her health failed, and, after a long illness, she died in Berlin in March last.

IT is not often that the English Church Establishment has a good word said for it in this country, but one must acknowledge that there is something valuable in the idea that the official clergy of a parish are bound to look out for the temporal as well as the spiritual welfare of all the inhabitants of the parish, whether they belong to their communion or not. Of course, we do not claim that all the English clergy fulfil their theoretical duty in this respect, but some of them undoubtedly try to, and to the labors of such men as Kingsley, Haweis and a dozen others the English poor owe a great deal in the way of increased bodily comfort, whether their souls, for whose sake the work was attempted, have profited by it or not. For all their efforts, however, a great deal remains to be done, and it will be long before the need of organized and judicious charity ceases to exist. According to some statistics collected by Dr. J. B. Russell, of Glasgow, and quoted in the *British Architect*, the population of that city is more crowded than that of any city in the United Kingdom except Liverpool, being eighty-four to the acre, while Liverpool has one hundred and six. Of course, like all British towns, a considerable part of Glasgow consists of detached dwellings, which contain a small number of persons to an acre of ground, but the average is kept up by the tenement-house districts, in which the population is three hundred and forty-eight to the acre, or about one person to every eleven feet square. In the proportion of tenement-houses Glasgow exceeds even New York. Out of every one hundred dwellings occupied by a family, thirty consist of only one room; forty-four have two rooms, fourteen have three, and only twelve have more than three. To put the case in a different way, one-quarter of the population lives in tenements of one room, and seventy per cent is crowded into dwellings consisting of not more than two rooms; while only eight per cent of the inhabitants live in houses of five or more rooms.

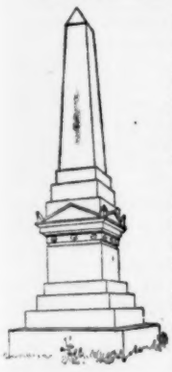
IT is hardly necessary to say that in the districts occupied by the small tenements the well-known evils due to overcrowding flourish. Diseases of all kinds, particularly those of the lungs, and children's diseases, carry off annually about five per cent of the dwellers in tenements, while the yearly mortality in the districts with large houses is only about one-third as great. Of little children, especially, five times as many, in every hundred, die annually in the tenement-houses as in the detached mansions, and one-fourth of all the children born there do not live to the end of their first year. Every month, on an average, three babies are smothered by having their drunken mothers roll over upon them, and no small proportion of them are sent out of the world by having whiskey administered to them. Bad as the present state of things is, however, it is much better than it once was. Twenty years ago the name of Glasgow was a by-word for the misery and degradation of its inhabitants. Out of a population of less than four hundred thousand, one hundred and forty-five thousand, or thirty-seven per cent, lived in dwellings of one apartment. In some districts the number of inhabitants, crowded in huge barracks on dirty and crooked alleys or "wynds," reached one thousand to the acre, and seven out of every hundred died annually. In 1867–68, by authority of Parliament, the city was authorized to carry out extensive improvements, and, at a cost of about two million dollars, it widened and extended streets, demolished the worst of the old barracks, and brought

light and air into depths where disease and crime had been for centuries undisturbed. At present, with a population of considerably more than half a million, the number of occupants of single-room dwellings is less than it was in 1861, while more people live in flats of two or three rooms than ever before. This in itself is a great gain. Where the young girls of a family are compelled to sleep in the same room with drunken boys, feminine modesty and virtue have but a small chance, and without these there is not much to be hoped for from a family in the way of neatness, economy and the other domestic graces. That these should be able to exist at all, as they undoubtedly do, among the helpless Glasgow women, as among the poor women of all other large cities, is an honor to the sex, and persons who enjoy a considerable share of the good things of this world would do well to ask themselves occasionally how steadfastly they would be capable of maintaining the decent habits in which they have been brought up if they should have to change places with their humble sisters; and whether they ought to take undiluted pride in the reflection that Providence has found it advisable to place them where they will have only rare and small temptations to encounter, and has chosen to show as nearly all the examples of heroic self-sacrifice, of unflinching courage and integrity, and of angelic purity, the poorest of the poor. Notwithstanding the sneers of the persons who talk about the uselessness of providing improved dwellings for people who prefer crowding and dirt, there is no question that for the sake of the women and children the law should give no choice in the matter. Nine-tenths of the women in the world, however warmly they may advocate the superior economy of one-room dwelling, wish to be sometimes by themselves, and are better and happier, and more useful, for enjoying this privilege; while children ought to have no choice at all in the matter until their moral sense has been sufficiently developed to fortify them against the corrupting influences of overcrowding. The families which can be virtuous in one room can be equally so in two; and many can be so in two which could not in one; and to that extent the public authority should be exerted. From London, Paris and New York, as well as Glasgow, the report of those who are qualified to speak on the subject is that one-room tenements expose their occupants to moral temptations and degradation, as well as physical influences which few can wholly withstand, and it is quite time that they were taken vigorously in hand.

MR. E. J. TARVER, an English architect of considerable distinction, has invented and patented a new type of theatre construction which presents many points of considerable professional interest. Unlike the plan devised by Mr. Henry Irving and Mr. Alfred Darbyshire, which, although well suited for entertaining a small audience in comfort and security, requires a site open on all sides, and provides but one gallery, Mr. Tarver's scheme is adapted to a site open only on one side and includes three circles or galleries in addition to the pit, or, as we should call it, the parquet-circle. Moreover, the space is so well economized that with an area exactly the same as that occupied by an existing London theatre, which seats seven hundred and sixty-six persons, Mr. Tarver accommodates twelve hundred and fifty persons with seats remarkably well arranged for seeing and hearing, leaving at the same time ample space for staircases, vestibules, foyer, or "saloon" as he calls it, parlors, and so on. The general idea of the arrangement, as Mr. Tarver frankly says, is borrowed from the Roman amphitheatre. Every architect is familiar with the plan of the Coliseum, for instance, in which the space under the sloping ranks of seats is occupied by corridors and staircases, the number of corridors diminishing as the height from the ground increases, and the space for them is lessened by the setting back of the rows of seats. It will be remembered also that access was obtained from the Roman corridors to the seats by means of passages cut through from each corridor to the front row of seats at that level, so that the spectators reached their places by coming first to the front and then climbing back from this point to the seat allotted to them something after the method still in use in travelling circuses. As in the circuses, so in the Roman amphitheatres, this disposition of passage-ways lent itself admirably to the rapid reception and dispersion of enormous audiences, and Mr. Tarver has adopted this principle as the basis of his plan. Entering the building from the street, a large vestibule first presents itself, with box-office in front, doors to the first circle on each side of the box-office, and at either end staircases to the circle above, which has also two separate street entrances. The staircases to the upper gallery, together with those to the pit, are situated outside the vestibule at either end, and are reached from the street by separate entrances. This arrangement is often adopted abroad, to keep the rabble who occupy the cheap seats in the pits and gallery from mixing in the vestibule with the people on their way to the better parts of the house, and Mr. Tarver accepts it, not only from this motive, but as an important part of his plan for avoiding crowding and confusion in case of fire.

THE second circle extends back over the box-office and other dependencies, so that, although it has only a balcony front, extending by means of cantilevers a short distance over the circle below, and requiring no columns to support it, it gives a large number of seats admirably situated for seeing and hearing, besides leaving room for the "saloon," with ladies' parlor at one end and gentlemen's room at the other, between it and the front wall. Over this, arranged in the same way, is the gallery, which extends to the street wall. The disposition of successively-retreating circles must give the theatre an aspect of openness and lightness very different from that of ordinary theatres, in which all the devices of the decorator need to be employed to dissimulate the sombre effect caused by the zones of deep shadow under the various galleries, while the approach of the lower seats to the stage is very advantageous both for seeing and hearing, and the gallery seats, although farther from the stage than any others, may for that reason be placed on a grade much less steep than usual, and are consequently more comfortable. As in the Roman amphitheatres, the staircases from below deliver the persons coming in near the front of their respective galleries. One row of seats is left next the balcony fronts, but behind this is an aisle through which the new-comers walk, looking at the ranges of seats above them until they see their own number. At first sight it would appear that the passing of persons arriving late in front of all the seats in their circle except the front row would be an annoyance to those who were already in their places, but by raising the seats back of the aisle, all those behind it can see over the heads of people walking in it, while the circumstance that those who come in can see all the numbers on the chairs at a glance must assist greatly in getting them quickly and quietly seated without calling in the aid of talkative ushers or other guides. Moreover, in case of fire, the occupants of each circle, having had the exit pathway in front of them all the evening, could not fail to start in the right direction in their rush for the doors, no matter what panic might exist, and, having gained the aisle, instead of converging to one point, as happens where a single staircase gives access to a long corridor, the people divide, some going to one of the side staircases and the others to the other. Once arrived at the stairway they are safe. Each stairway, though compact, is open to the outer air and shut off by heavy walls from all the rest of the theatre. Landings are frequent and the turns gradual, and a frantic rush or a blockade of any portion is hardly possible. Although a theatre built on an isolated site, with many entrances and stairways on all sides, would undoubtedly be safer than any building which could be erected on a lot hemmed in on all except the street side, Mr. Tarver's plan shows that one even under these circumstances can be made much safer than most of those now in use, while the cleverness with which he has secured this result, at the same time with extraordinary seating capacity, brilliancy of internal effect, perfect acoustic quality and convenience for seeing, and liberal provision for accessory rooms, shows, to our mind, the success with which such a problem can be solved by a thoroughly-trained architect if he is allowed to manage it in his own way. Of course very few architects are allowed, in designing theatres, to depart from the stereotyped arrangement with which managers and actors are familiar, and still fewer, if they were permitted to do so, would bring to the work the skill, as well as the profound study of the conditions displayed by Mr. Tarver, but after the remarkable merits of his scheme have been digested by future theatre proprietors, and, we may hope, utilized by adopting his plan, there will still be plenty of work to be done in arranging details for different conditions, for which the best architectural talent will be needed.

MEMORIALS TO CAPTAIN NATHAN HALE. — I.



Hale Monument at Coventry, Conn. Henry Austin, Architect.

IF there is on record no nobler expression of pure patriotism, than the quiet words uttered by young Captain Nathan Hale a moment before his life went out on the gibbet as a spy, so, there is no more sorrowful history than the lack of fitting remembrance, by his military associates and countrymen, of his voluntary and heroic immolation upon the altar of his country.

Hale was born in Coventry, Connecticut, June 6, 1755. His family was eminently Puritan in its faith, tastes, and manners. All accounts agree that Hale himself was a person of superior character and attainments in all respects. He was graduated from Yale College, in 1773, and was intended, by his father, for the ministry. He taught school from the time of his graduation until the news of the battle of Lexington arrived in New London, Connecticut, where Hale was then teaching. The citizens at once assembled in town-meeting and passed resolutions in favor of resistance to the mother country. Hale was one of the speakers at this meeting, and in his address he spoke the following words with such emphasis and eloquence that they surprised even those who heard them. "Let us march immediately, and never lay down our arms until we obtain our independence." It is believed that Hale was the first colonist to use this word "*independence*" as the ultimate desire of those who opposed the claims of Great Britian. He immediately enrolled himself as a volunteer in an independent company, wrote to his father that "a sense of duty urged him to sacrifice everything for his country," bade farewell to his pupils, and set out for the scene of action. Returning soon after to New London, he joined, as lieutenant, a company belonging to a State regiment, and remained there until September, when his regiment marched to Boston. In January, he was commissioned as captain, by the Continental Congress, and served in the brigade of General Spencer around Boston, until the following April, when he went with the troops under General Heath to New York. While in the vicinity of Boston he distinguished himself as a military student, and a most thorough and humane disciplinarian. His own company became a model for others, and its excellence was noticed with commendations by his superior officers. When in November, 1775, the army was threatened with dissolution by the expiration of enlistments, Hale rendered conspicuous service; he cheered General Lee and other officers when sadly cast down by the prospect, and going around in person to the men urged them, by every patriotic consideration which he could devise, to remain and fight the battles of their country. Not content with this, he promised his own company his personal wages if they would remain, and to make his pledge good he borrowed money on the credit of his own advance pay.

When in New York he had but one opportunity of signalizing himself, before the event which brought him immortal fame. This was the capturing of a British sloop, laden with supplies, which was anchored in the East River under the protection of the sixty-four gun ship "*Asia.*" After the disastrous battle of Long Island had been fought, August, 1776, the American troops, filled with despair, retreated to the island of New York. As if the thunder of the British arms had deafened their ears to the solicitations of patriotism, the militia began to desert by companies and even by entire regiments; of those that remained, fresh as they were from the workshop and the field, a large portion were impatient of restraint, and clamorous for pay — one-fourth of them were on the sick-list, one-third were without tents. They had clothes, shoes and blankets only for a summer campaign, and winter was approaching, food and forage were difficult to obtain. The military-chest was entirely empty of money, and had been so for two months. In positive suffering from want of supplies, without confidence, without subordination, importunate in complaints, the American army — fourteen thousand only fit for duty — lay, in the early part of September, 1776, stretched along from the Battery to Kingsbridge, detached, agitated, and full of gloom. And facing them, from the extreme southern point of Long Island to a point opposite the Heights of Harlem, posted at all available places, riding in ships and transports, was arranged a British army of not less than twenty-five thousand men, magnificently equipped with warlike materials of every kind, under the command of able generals, now in the first flush of victory, and there for the special purpose of "looking down and forever ending the opposition of the rebels."

What would be General Howe's next step was a question of infinite importance to Washington and his enfeebled and dispirited army: of a dozen projects which the British commander might attempt to carry out, not one could be surmised by Washington, nor could he procure the least information. And yet, the fate of the American army depended upon the possession of the knowledge of where the enemy would make its attack, in order that timely preparations could be made to repel it. Every effort was made by the American commander, by scouts and by offered bounties to British deserters, to obtain some precise information of the enemy's designs. But all in vain. It was the policy of Howe to deceive, and thus far he had succeeded.

Some one, thought Washington, must go into the British camp and find out its intentions, or the American army was lost, and he communicated this opinion to his board of officers. The board agreed fully with the views of the commander-in-chief, and Colonel Knowlton was instructed to select some competent person for the hazardous undertaking, Of the character of this undertaking, Hon. J. M. Stuart, in his "*Life of Hale,*" observes: "An office not alone hazardous. What else was it? To appreciate the position of Hale, it is necessary to dwell a moment upon it. It was an office also ignominious. In the judgment of every civilized nation, in the eye of all national law, the use of spies is deemed 'a clandestine practise and deceit in war.' It is a fraud unworthy of an open, manly enemy, scarcely redeemed in motive by any exigency of danger, and pregnant with the worst mischief in stimulating, from a sense of betrayal, the vengeance of the enemy, and undermining those sentiments of honor, which, like dry shoots of sunlight upon a thunder-clouded sky, tend to soften the blackness of war. The spy is the companion of darkness. He lurks, he hides, or if he moves in the light, it is behind walls, in the shadows of trees, in the loneliness of clefts, under the cover of hills, in the gloom of ditches, skulking with the owl, the mole or the Indian. Or if he enters the camp of an enemy, he insinuates himself, and winds treacherously into confidence. Caught, his sure penalty is the halter. 'Nathan Palmer, a lieutenant in your King's service,' wrote General Putman, from his camp at Peakskill to Governor Tyron, 'was taken in my camp as a *spy*, he was tried as a spy, and you may rest assured, Sir, he shall be hanged as a spy. P. S. Afternoon. *He is hanged.*' This pithy, laconic epistle, communicating the fate of one tory agent of the sort of which we speak, during our Revolution, only too truly describes the quick aversion, particularly of soldiers, to all those who disguisedly enter a military camp to bear off its secrets to an enemy, and the speed with which such persons pass from capture to the gallows. And yet, notwithstanding all this, the employment of a spy in some crisis of the last importance is not judged unworthy of a great commander. His success is thought most meritorious, and is followed, if not preceded, by honors and rewards. Only a sovereign may not ordinarily command the service, so is it deemed disgraceful, but save from an enemy's subjects he may accept it when voluntarily offered, 'without offence to honor or justice.'"

The exigency of the American army would not permit the employment, in the service proposed, of any ordinary soldier, unpractised in military observation and without skill as a draughtsman, least of all of the common mercenary, to whom, allured by the hope of large reward, such tasks are usually assigned. Accurate estimates of the numbers of the enemy, of their distribution, of the form and position of their various encampments, of their marchings and countermarchings, of their concentration at one point or another of the instruments of war, but more than all, of their plan of attack, as derived from the open report, or the unguarded whispers in camp of officers or men; estimates of all these things, requiring a quick, a cool head, a practised pencil, military science, general intelligence, and pliable address, were to be made.

Colonel Knowlton, therefore, made a personal appeal to the officers of his own and other regiments, assembled for the purpose, and in the name of Washington, and the cause of their country, urged them to undertake the task. It was too irredeemably humiliating to play the spy; an officer could not do it: all declined. The colonel's case seemed hopeless. What was to be done? How could he face his commander? "Suddenly, from the group of reluctant, half-resentful officers, at the moment when all hope for the enterprise seemed lost, and the heart of Knowlton, saddened with the thought of future misfortune, was fast yielding to the torture of disappointment, there came a voice with the painfully thrilling, yet cheering words — 'I will undertake it!' It was the voice of Captain Nathan Hale. He had come late into the assembly of officers. Scarcely yet recovered from a severe illness, without his accustomed strength of body, yet firm and ardent as ever of soul, he volunteered at once, reckless of its danger, to discharge the repudiated trust. His fellow officers urgently remonstrated against his decision, by every argument they could bring to bear, and none with more persistence than Captain, afterwards General, William Hull, who was Hale's companion in college, and his intimate in camp. To all of which Hale replied: 'I think I owe to my country the accomplishment of an object so important, and so much desired by the commander of her armies, and I know no other mode of obtaining the information, than by assuming a disguise and passing into the enemy's camp. I am fully sensible of the consequences of discovery and capture in such a situation. But for a year I have been attached to the army, and have not rendered any material service, while receiving a compensation for which I make no return. Yet I am not influenced by the expectation of promotion or pecuniary reward. I wish to be useful, and every kind of service necessary for the public good becomes honorable by being necessary. If the exigencies of my country demand a peculiar service, its claims to the performance of that service are imperious.'"

Receiving, as it is affirmed, from the commander-in-chief in person, particular instructions, and a general order upon all the American sloops or other vessels in the Sound to convey him across to any point upon Long Island which he should designate, Hale, about the middle of September, carrying with him materials for a disguise, and accompanied by Stephen Hemstead, a trustworthy soldier of his own company, left the camp at Harlem Heights intending to cross the Sound at the first opportunity. But as the enemy's vessels were constantly

cruising along the East River and up the Sound, and its scouting and foraging parties lined the shore of Long Island, Hale and his companion were obliged to go as far as the neighborhood of Norwalk, nearly fifty miles, before they found a friendly sloop to carry him across to the opposite shore. Putting on the costume of a country schoolmaster, and bidding his comrade to await his return, he set sail for the head of Huntington Bay. Although he was familiar with the character and costume of a schoolmaster, and could appear with ease and self-possession in this disguise, and also carried with him his college diploma, he was now to pass into a locality occupied and mostly controlled by the British and their abettors. Crossing the Sound he landed at a point, then and now known as "the Cedars." Near by stood the house of Widow Rachel Chichester, or "Mother Chich," who, herself a royalist, made her house a rendezvous for all the tories of the region. Hale passed this place in safety, called at the dwelling of William Johnson, who received him confidentially, ate a hearty breakfast, rested a few hours and proceeded on his way. It is known that Hale was successful in obtaining the desired information, that he visited safely the enemy's camp, studied its fortifications, and returned to "the Cedars" early in the morning of the twenty-first of September, 1776. Emboldened no doubt by his hitherto good fortune, and feeling secure in his disguise he entered, it is affirmed, the tavern of "Mother Chich." Of his arrest, which took place an hour or two later, there are two accounts.

Joan of Arc. Fremiet, Sculptor.

One on the authority of Doctor Ray, of Huntington, Long Island, says that while Hale was sitting in the house "*a man with a familiar face left the room*," and very soon after Mother Chich suddenly announced to her guests that a strange boat was seen approaching the shore. The news produced consternation among the loyalists, and they ran away as fast as they could, while Hale concluded that it was the boat intended to carry him across to Norwalk where he had left Hempstead. He accordingly hastened to the shore, where the boat had already struck, and before he could retrace his steps, he saw that it contained six British soldiers with their muskets pointed at him; he gave himself up at the command "Surrender or die."

The man with the familiar face, above referred to, was affirmed to be a royalist relative of Hale, who, recognizing Hale in spite of his disguise, notified a British armed vessel that was lying around the point and out of sight of "the Cedars" and which sent a boat-load of armed men to capture the spy. It was also affirmed that Hale discovered this person among the boat's crew, and recognized him as a relative, Samuel Hale, a royalist. The above statement of the connection of Samuel Hale with the arrest of Nathan, was denied by the former. There was also a report exactly opposite, in 1776–7, to the effect that Samuel Hale "strove earnestly to save his cousin Nathan."

The other account of the capture is, that Hale arrived in the vicinity of "Mother Chich's" house early in the morning, and was on the watch for an expected boat which was to carry him across the Sound; and that seeing one approach the shore, he walked confidently towards it, supposing it to be of a friendly character, when lo! to his utter surprise, as it struck the shore she proved to be British. He attempted to retrace his steps, but the imperious summons to surrender, and the levelled muskets, caused him to stop. Escape was impossible. He turned, gave himself up, went on board the boat, and was transferred to the vessel above mentioned as lying near by. It was a guard-ship, the "*Halifax*," Captain Quarme, sent there to protect a body of men who were cutting wood for the British garrison at New York.

Captain Quarme suspected that Hale was a spy, and his suspicions proved true, for on searching him the plans and memoranda he had made were found in his shoes. The textual explanations were written in Latin. Captain Quarme treated Hale with kindness, and said that he regretted "that so fine a fellow had fallen into his power." Hale was at once sent to New York, in one of the boats of the "*Halifax*," — arriving there in the midst of a great fire that consumed nearly five hundred houses, or almost one-third of the city — and was conducted to the presence of General Howe, whose headquarters were at the mansion of James Beekman, at present the corner of Fifty-First Street and First Avenue. There, Hale frankly and at once acknowledged his mission, confessed himself an American officer and a spy, stated his success as such, expressed his regret that his hope of serving his country was now cut off, and calmly awaited the decision of his judge. That decision was soon made. It was that William Cunningham, Provost Marshal of the Royal army, was directed "to receive into his custody the body of Nathan Hale, a captain in the Rebel army, that day convicted as a spy, and to see him hung by the neck until dead, tomorrow morning at day-break."

Where Hale spent the night, whether at the headquarters of General Howe, or those of the Provost, in what is now the Hall of Records, is not positively known. It is only known that he was seen at the latter place the night before his execution. It is known that he received the usual treatment, the cruelest, meted out by Cunningham to all his unfortunate prisoners. All authorities agree that Cunningham, a renegade Irishman, was a most brutal ruffian, and that his acts exceeded the worst of all those that disgraced the British forces during the war. He refused, with curses, Hale's request for permission to write to his family, or to have a Bible. The young lieutenant, however, of Hale's guard interfered in the latter's behalf, and procured him the privilege of writing. As the morning approached Cunningham found Hale ready, and he handed to the former the letters he had written to his family and to his betrothed. Cunningham read them, and furious at their contents, and for the reason, afterward given by himself, "that the rebels should never know they had a man who could die with such firmness," tore them to pieces, and ordered his victim to begin his death march.

On the way to the gallows Hale was taunted with the ignominy of death by the halter. An English officer, who stood near the cart of execution, remarked that "This was a fine death for a soldier." "Sir," replied Hale, lifting his cap, "there is no death that would not be rendered noble in such a glorious cause." As he was about to be pushed from the ladder, that supported him, into eternity, Cunningham scoffingly demanded his dying speech and confession. Hale exclaimed, in a full, clear, distinct voice, as the immortal testament of his heroic soul to the world he was leaving — 'I only regret that I have but one life to lose for my country."

Maddened to hear an expression so sublime, from the lips of his victim, and to witness so many visible signs of sympathy for him from the crowd, Cunningham instantly shouted, "swing the rebel off!"

It is not known exactly when Hale was hung or where he was buried, but it is believed that the gallows was near the jail, or Hall of Records and that he was buried near by.

The news of his death was conveyed to Washington, by Colonel Montaznar, under a flag of truce, and through the hands of Alexander Hamilton. How Washington felt about it is not known. Nor is it known that either he, or any of Hale's military comrades, or friends, communicated the awful news to Hale's family or uttered a word of sympathy or condolence. It is certain that for a long time his family did not know the exact date of his death. This appears all the more surprising and heartless, because soon after, when the British spy, André, was taken, there was a general commotion in the army to which he belonged, a lengthy correspondence between Washington and Howe, and a great deal of sympathy shown to the Briton, by Americans as well as royalists. Some persons have attempted to excuse the silence of Washington, and the after forgetfulness of Hale by his brother officers. But the sad fact remains, it was the beginning of that oblivion which claimed Hale's memory as its own from the moment of his capture.

Neither is it known by what means Hale's parents heard of his death. When the news did reach them, "it almost killed his father and mother." Hale's servant, Asher Wright, was never of sound mind after the death of his master. And his betrothed, Alice Adams, resolved never to marry.

An American officer, writing a letter from Harlem, in September, 1776, which was published in the *Boston Gazette* of October 7, says, "One *Hale*, on suspicion of being a spy, was taken up and dragged without ceremony to the execution post, and hung up."

The gazetteers of the day made little more than the most meagre mention of him. In Spark's "*Life of André*," there are a few paragraphs, and a few in Thompson's "*History of Long Island*."

Thirty-three years after his death, a brick fort, long since in ruins, was built in New Haven Harbor, and named after him. A simple rude stone, was erected by the side of his father's grave, in the Congregational burying-ground in Coventry, bearing this inscription — "Nathan Hale, Esq., a Captain in the Army of the United States, was born June 6, 1755, received the first honors of Yale College, Sept.; 1773, and resigned his life a sacrifice to his country's liberty at New York, Sept. 22, 1776, aged 22." An entry was also made in the town records of Coventry by his brother, Major John Hale, as follows — "Captain Nathan Hale the son of Deacon Richard Hale was taken in the city of New York by the Britons and executed as a spie sometime in the month of September, A. D. 1776."

In November, 1837, the citizens of Coventry and vicinity, and many in Connecticut who cherished the memory of the martyr, united in forming the "Hale Monument Association," for the purpose of erecting a cenotaph to his memory. Previous to this, however, Congress had been appealed to — no less than eight successive years — to, at least, assist in erecting a monument. But every appeal was in

vain. It could erect memorials to Montgomery, Nash, Mercer, DeKalb, Gerry, Brown, and others, and vote farms and annuities to the captors of André, but not a dollar to remember Hale. It could vote busts, and swords, and medals by the score, but Hale's name received no welcome echo.

The Hale Monument Association appealed to private patriotism, and depended upon individual effort.

Under the leadership of Mr. J. W. Boynton, the secretary of the association, private subscriptions were obtained, fairs were held, plays were written and acted, musicales were given, and every other device practised that patriotic love could contrive, until nearly two thousand dollars were raised. The State gave twelve hundred and fifty dollars. In all the exertions made to collect this amount of money, none equalled that of the ladies of Coventry and Hartford. A song was written by Miss J. Root, of Andover, Connecticut, addressed to the "Daughter of Freedom," and was sung by the Coventry Glee-Club — the first verse ran thus:

"She came with choicest flowers
To deck a hero's grave,
To shed the light of love around
The memory of the brave."

A drama in five acts, was written by Mr. David Trumbull, and exhibited with accompanying tableaux in the meeting-house in South Coventry.

The monument was completed in September, 1846, at a cost of three thousand seven hundred and thirty-three dollars and ninety-three cents. It was designed by Henry Austin, a New Haven architect, and built under the supervision of Solomon Williard. It is made of Quincy granite, and is forty feet high. The various railroads, running from Quincy to Norwich, Connecticut, transported the granite free. Mr. Nathan Hale, of Boston, nephew and namesake of the patriot was nobly active in the erection of the monument.

The inscription consists of Hale's name, title, date of birth and death, and his last words.

Hale's fate has been occasionally mourned by the Muse of Poetry and the pen of the epitaph writer. A beautiful example of the latter was written by Mr. George Gibbs, formerly Librarian of the New York Historical Society. It is as follows:

"Stranger Beneath this Stone
Lies the dust of
A Spy
who perished upon the Gibbet
Yet
the Storied marbles of the Great
The Shrines of Heroes
Entombed not one more worthy of
Honor
than Him who here
Sleeps his last sleep.
Nations
bow with reverence before the dust
of him who dies
a glorious Death
urged on by the sound of the
Trumpet
and the shouts of
admiring thousands
But what reverence, what honor
is not due to one
who for his country encountered
Even an infamous death
Soothed by no sympathy
animated by no praise.

In 1849, two chapters of the Order of United Americans were instituted and named after Hale. A monument was also proposed to be erected by some citizens of Brooklyn, N. Y.

In 1853, at the centennial meeting of the Linonian Society of Yale, of which Hale was a member, Francis M. Finch read a poem on Nathan Hale. This is the first verse:

To drum-beat and heart-beat,
A soldier passes by;
There is color on his cheek
There is courage in his eye;
Yet to drum-beat and heart-beat
In a moment he must die.

Another:

Neath the blue morn, the sunny morn,
He dies upon the tree;
And he mourns that he can lose
But one life for Liberty;
And in the blue morn, the sunny morn
His spirit wings are free.

The last verse:

From fame-leaf and angel-leaf,
From monument and urn,
The sad of earth, the glad of heaven,
His tragic fate shall learn;
And on fame-leaf and angel-leaf
The name of Hale shall burn.

In 1856, the Hon. J. W. Stuart, of Hartford, published a "*Life of Hale*" including all attainable facts concerning him. At the end of the volume he prints more than forty notices of his book, from historians, scholars, statesmen, and newspapers. In all of them there is not a single expression of enthusiasm, not a phrase of inspiring appreciation, not a word of awakening of what Hale really was.

Switzerland receiving a wounded French Soldier.

Within a year or two Mr. B. J. Lossing has published a book, entitled "*The Two Spies.*" Referring to the Hartford project, of which I shall soon speak, he very sensibly recommended that the superb epitaph by Gibbs, should be cut upon the pedestal.

The late Hon. H. J. Raymond, in his address, October 7, 1853, at the dedication of the monument to commemorate the capture of André, in Tarrytown, N. Y., paid Hale a beautiful and eloquent tribute.

"The loving hearts of Hale's early companions have erected a neat monument to his memory in his native town; but beyond that little circle, where stands his name recorded? While the Majesty of England in the person of her Sovereign, sent an embassy across the sea to solicit the remains of André at the hand of his foes, that they might be enshrined in that sepulchre where she garners the relics of her mighty and renowned sons — 'splendid in their ashes and pompous in the grave' — the children of Washington have left the body of *Hale* to sleep in its unknown tomb, unhonored by any outward observance, unmarked by memorial stones. Monody, eulogy,— monuments of marble and of brass, and of letters more enduring than all, — have in his own land and in ours, given the name and fate of *André* to the sorrowing remembrance of all time to come. American genius has celebrated his praises, has sung of his virtues and exalted to heroic heights his prayer, manly but personal to himself, for choice in the manner of death,— and his challenge to all men to witness the courage with which he met his fate. But where, save on the cold page of history, stands the record for Hale? Where is the hymn that speaks to immortality, and tells of the added brightness and enhanced glory, when his equal soul joined its noble host? And where sleeps the Americanism of Americans, that their hearts are not stirred to solemn rapture at thought of the sublime love of country, which buoyed him not alone 'above fear of death,' but far beyond all thought of himself, of his fate and his fame, or of anything less than his country,— and which shaped his dying breath into the sacred sentence which trembled at the last upon his quivering lip?"

T. H. BARTLETT.

[To be continued.]

ANCIENT AND MODERN LIGHT-HOUSES.[1] — XIX.

SKELETON IRON LIGHT-HOUSES, CONTINUED.

IN 1873 the old brick tower at Southwest Pass, Mississippi River, built in 1831, was replaced by a skeleton iron structure. The old tower was in a dilapidated condition, had sunk several feet into the soft ground, was three or four from the perpendicular, and its light was of an inferior order compared with its importance. At this place, the great difficulty was to obtain a secure foundation on the soft and treacherous alluvial formation of the Delta of the Mississippi. The plan adopted was as follows:

The foundation is octagonal in shape and fifty-eight feet eight inches lesser diameter. It consists first of one hundred and eighty-five square piles driven four feet apart to a depth of thirty-three feet. At six feet below the tops of the piles, which are one foot below low water, a horizontal course of twelve-inch square timbers are notched into them. Below the timbers a mass of shell concrete two

[1] Continued from No. 635, page 88.

feet thick is rammed about the piles, and on the timbers rests a floor of three-inch plank. Above this floor are a second and third course of timbers notched into the piles and laid at right angles to each other and diagonally to the first course. A mass of concrete is forced into the interstices of the timbers and filled up to a height of

four feet above the third tier, bringing the top of the foundation eighteen inches above the main level of the water. The superstructure is a skeleton iron tower composed of six series of eight cast-iron columns placed at the angles of an octagon and strongly braced and tied by wrought-iron rods. On the sixth series stand the watch-room and lantern, access to which is gained by a stairway winding round the axis of the tower and inclosed in a wrought-iron cylinder. The keeper's dwelling, two-stories high, rests on the first series of columns.

The tallest skeleton tower in the Light-House Service was erected at Hell Gate, Astoria, N. Y., in 1883–84. It is two hundred and fifty feet high and was intended to display nine electric lights of six thousand candle-power each to illuminate the channel. Its construction is sufficiently well shown in the sketch. Within the legs of the structure are seen the engine and boiler house. When the lamps were lighted the effect was very beautiful. The tower was invisible and the lights had the appearance of an immense chandelier suspended in the heavens and flooding the scene with their brilliant light.

At the explosion at Flood Rock in 1885 advantage was taken of this tower to photograph the explosion and get a plunging view on the rock.

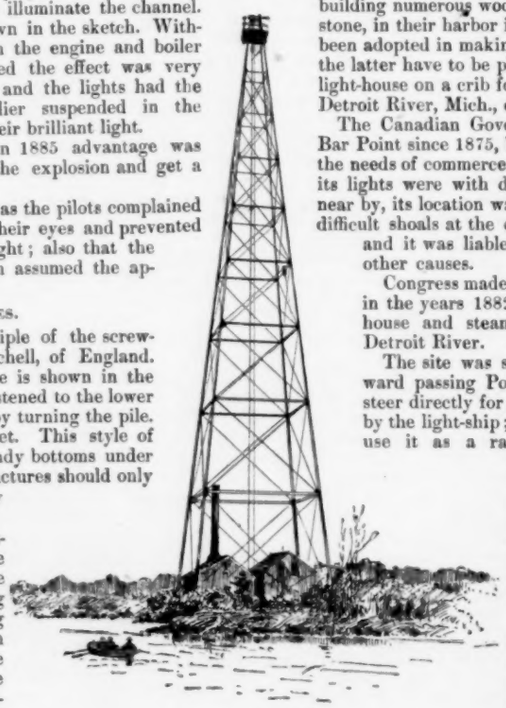
In 1886 this light was discontinued, as the pilots complained that it was so brilliant that it dazzled their eyes and prevented them from seeing objects beyond the light; also that the shadows were so heavy that they often assumed the appearance of obstacles.

SCREW-PILE LIGHT-HOUSES.

As previously mentioned, the principle of the screw-pile was invented by Alexander Mitchell, of England. The way the foundation screw is made is shown in the accompanying sketch. The screw is fastened to the lower end of an iron pile and forced down by turning the pile. It is sometimes assisted by a water-jet. This style of foundation is especially adapted to sandy bottoms under water, but in my opinion iron-pile structures should only be used in southern waters where they would not be exposed to floating ice.

There are a number of such structures in Chesapeake Bay, and the method of building has been the same in each case, the only difference being in the number of piles used, the bracing and the style of superstructures. In several cases these light-houses have been threatened with destruction by the ice, and it has been necessary to protect them with a ring of rip-rap placed at such a distance from the light-house that it would act as an ice-breaker.

The accompanying sketches show several of these structures. The general plan of all is a one-story dwelling with lantern in the centre. Most of them are also provided with fog-bells rung by clock-work. The projecting piles, shown in some, partially serve the purpose of ice-breakers. A time-honored joke of the light-keepers is that they have fine fishing privileges and that they raise all their own vegetables.



The "Bug Light" in Boston Harbor, officially known as "The Narrows Light," built in 1856, is another example of this style. Fortunately for its stability the shoal on which it was erected has so changed since the light was established that it is now seldom covered with water and the piles have been spared the shock of floating ice.

On the east side of the dredged channel in Mobile Bay, Ala., an hexagonal screw-pile structure was built during the years 1884–85. The bottom is soft mud, and on September 12, 1885, when the light-house was nearly completed, it commenced to settle, and went down bodily seven and a half feet. The subsidence was so nearly equal

on each column that the inclination of the structure cannot be detected by the eye. The actual difference in level between the extremes at the top of the foundation series is between three and four inches. No part of the structure was strained in the least. In order to prevent further subsidence, twelve creosoted piles were driven into the mud alongside of the structure and bolted to it. They were then cut off at about the water level. Since then the light-house has sunk no further.

LIGHT-HOUSES ON THE GREAT LAKES.

On our "unsalted seas," the great lakes, light-houses are as necessary as on our sea-coasts; on their shores timber of excellent quality is plentiful and cheap, and when submerged is practically indestructible as it is not exposed to the greedy tooth of the ship-worm which so soon destroys any wooden structures, especially in our southern waters and in the Pacific.

Advantage has been taken of this by army engineers in building numerous wooden piers, composed of cribs filled with stone, in their harbor improvements; and similar plans have been adopted in making the foundations for light-houses when the latter have to be placed in the water; an excellent type of light-house on a crib foundation is the one built in the mouth of Detroit River, Mich., during the years 1884–85.

The Canadian Government had maintained a light-ship on Bar Point since 1875, but though useful, it was not adequate to the needs of commerce. It could be seen only a short distance, its lights were with difficulty distinguished from vessel lights near by, its location was of little service as a guide between the difficult shoals at the entrance to the river inside its position, and it was liable to be driven from its station by ice or other causes.

Congress made appropriations to the amount of $68,000 in the years 1882–83 and 1885 for establishing a light-house and steam fog-signal at or near the mouth of Detroit River.

The site was so selected that vessels from the Eastward passing Point Pelée and sighting the light, could steer directly for it and clear the dangerous shoal marked by the light-ship; that vessels from the south-west could use it as a range with the Bois Blanc (Canadian) light to clear the long spit off Point Mouillée, while there would be no dangers in front for vessels approaching from any intermediate point; and finally, that this same range with Bois Blanc light would also lead through the narrow buoyed channel in the mouth of the river.

Soundings at the site showed that the bottom was generally quite level with a uniform depth of 22 feet. Borings gave approximately uniform results, the first three or four feet being composed of hard limestone, gravel and sand, very compact and difficult to penetrate, then twelve feet of soft clay and fine sand, easily penetrated, and finally underlying the whole a bed of tough, hard blue clay, very difficult to bore. No boulders were encountered.

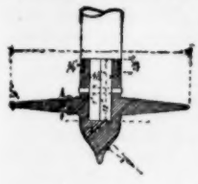
The general plan of the foundation is a crib of heavy timbers with a tight bottom, this crib is 90 feet long, 45 feet wide and 18 feet high, thus bringing its top to four feet below high water; it is filled with concrete flush to its top.

This crib supports a pier 15 feet high of cut-stone masonry backed

with concrete, the foot of the pier is nine inches back from the edge of the crib.

On the southern end of the pier is a cast-iron conical tower surmounted by a fourth-order lantern; in this tower, the keepers live.

The fog-signal house, containing duplicate steam fog-signal apparatus, is built of heavy framed timber covered on the exterior with two inch planking and with inch boards on the inside, the space between is filled with mortar made of lime and sawdust. The roof and sides are covered with No. 18 corrugated iron, and the interior with No. 26 plain sheet-iron.

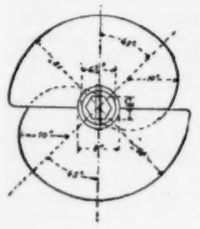


Section.

Foundation Screw.

The coal cellar is underneath the fog-signal house.

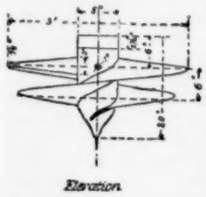
Amherstburg, Ontario, was the most convenient point at which to build the crib, and permission was obtained from the Governor-General of Canada to construct the crib there and to introduce the necessary tools, materials, etc., free of duty.



Plan.

Framing the crib commenced on March 19, 1884, on July 1 it was completed and partly filled with concrete while floating at the wharf, on July 3, it was sunk in place, by September it was filled with concrete, on November 21 the last course of cut stone was in place and backed with concrete; work was then suspended for the season, a temporary shelter was built and two men were left to display warning lights until the close of navigation.

During the filling of the pier the settlement was uneven, and at the close of the working season it had reached nearly 16 inches.



Elevation.

It was therefore decided to load the pier and leave it loaded during the winter with a much greater weight than it would ultimately have to stand. For this purpose 550 tons of rubble stone were distributed over the pier with a preponderance on the high side. The calculated weight to be borne ultimately was but 160 tons.

The settlement continued slowly for a while and then ceased; when the men in charge of the lights left it was 18 inches, the pier was level and since then there has been no change.

Work was resumed in May, 1885, the pier was paved, the various structures erected and the station entirely completed and lighted by August 20, of the same year.

This light-house was built under the immediate direction of Captain C. E. L. B. Davis, Corps of Engineers, from plans prepared by him.

On the completion of this light-house the Canadian light-ship at Bar Point was removed from her station.

[To be continued.]

The Illustrations

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

HOUSES ON COMMONWEALTH AVENUE, BOSTON, MASS. MR. CHARLES B. ATWOOD, ARCHITECT, NEW YORK, N. Y.

[Gelatine print, issued only with the Imperial Edition.]

MASONIC BUILDING, PITTSBURGH, PA. MESSRS. SHEPLEY, RUTAN & COOLIDGE, ARCHITECTS, BOSTON, MASS.

THIS design was accepted by the Freemasons in a recent competition.

LIGHT-HOUSE IN MOBILE BAY, ALA.

FOR description see article on "Ancient and Modern Light-houses" elsewhere in this issue.

GATE-LODGE FOR THE EASTERN POINT ASSOCIATES, GLOUCESTER, MASS. MESSRS. APPLETON & STEPHENSON, ARCHITECTS, BOSTON, MASS.

HOUSE FOR F. B. HART, ESQ., MINNEAPOLIS, MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

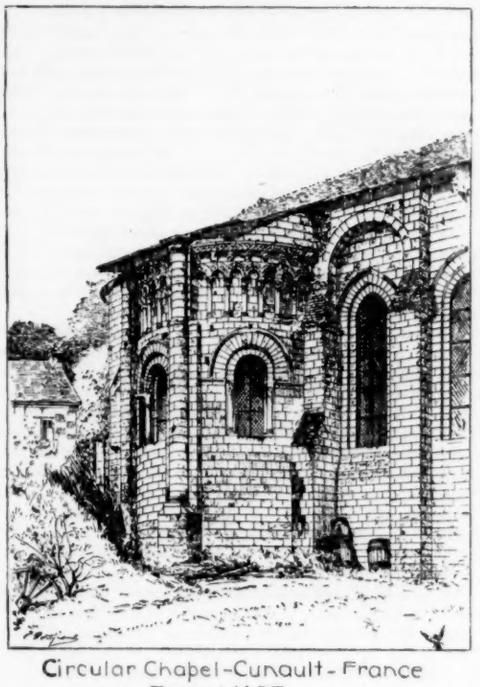
MUSIC-GALLERY AND BUFFET IN THE SAME HOUSE.

DESIGN FOR A TWENTY-FOOT HOUSE. MR. F. W. BEALL, ARCHITECT, NEW YORK, N. Y.

FURNITURE DESIGNED BY MR. CHARLES E. LANDERKIN, BOSTON, MASS.

BELFRY OF THE HOTEL DE VILLE, BRIEG, PRUSSIA.

THE ART OF HOUSE-BUILDING. — I.



Circular Chapel - Cunault - France
From L'ART.

M. J. BOUSSARD, architect and officer of Public Instruction, has just published under this title[1] at the Librairie des Imprimeries réunies, at Paris, a book which, in spite of its special title, has a general interest. It treats of questions which not only concern those who wish to build or repair houses, but questions of health, public and domestic economy, morality, enjoyment, security, and everything which concerns the habitation, and ought to attract the attention of the public authorities, the statesmen and the legislators in countries where private initiative is powerless to undertake new reforms without the support of the State. One may say, when the importance of this question is recognized, that the civil power of a nation always gives the exact measure of the degree of civilization at which it has arrived, and that a people has only such dwellings as it deserves through the knowledge it has acquired of the conditions which conduce to healthy, convenient and agreeable habitations.

The author maintains here a thesis which may be discussed and which ought to be, but he supports it with some brilliancy. His conception is that the ideal building is typified in the Gallic house as it existed in the second century, and to justify his retrospective enthusiasm he dedicates his book to Brennus, conqueror of Rome. But when he speaks of the Gallic house, M. Boussard can only understand, and does really understand, the Roman house, for the architecture which flourished in France at the epoch I have just mentioned could only be, and in fact was, a fruit of Roman importation after the conquest of Cæsar. In the train of the conquerors, Roman civilization passed into Gaul, and there manifested itself under every form. Already in the reign of Augustus there was held at Narbonne a congress to determine the impost and the manner of providing in the conquered provinces such establishments as favored progress, public prosperity and civilization. In less than two hundred years Gaul was covered with flourishing cities and splendid architectural monuments, of which only rare relics, alas, have escaped the fury of successive invaders. Road-making had reached a very remarkable degree of perfection; artistic bronzes, terra-cottas, marbles, paintings, frescos, mosaics, all the accessories of decoration, were scattered with lavish hand. The smallest articles of household use which have been discovered prove that the artistic taste extended to the most ordinary needs of life. But at the beginning of the fifth century the invasions of the barbarians destroyed this world that had been created beyond the Alps through Roman initiative. Pillage, murder, and the blind rage for destruction allowed almost nothing to remain. The implacable and raging invaders pushed everything before them, massacred the populace and razed the cities in such fashion that on the morrow of disaster were seen rising on the ruins of the desecrated palaces the huts of the Visigoths, the Saxons or the Germans. A new architecture was substituted for the old. A century afterwards the chiefs of the victorious tribes began to build châteaux, about which were grouped, for purposes of defence, the huts of the soldiers, already became serfs or slaves. The new society, already on the road to dismemberment, practised all the vices of the society it had deposed—slavery, love of war and rapine—without possessing any of the better qualities of Roman civilization. Then began a

[1] "*L' Art de batir sa Maison*" Librairie des Imprimeries réunies, Paris.

long period of barbarism, in the course of which disappeared every tradition of intelligent architecture. The dead were interred in churches, near to which were built hospitals for the sick. The arts of heating and cleanliness were ignored. The exteriors of buildings were embellished to satisfy the vanity of feudal chiefs, but the interiors lacked comfort and healthful arrangements. Fourteen centuries were necessary for the descendants of the ancient Gauls to perceive this retrogression, and still more were needed; the teaching of Viollet-le-Duc, who in part aimed at the rehabilitation of the architectural doctrines of antiquity, and he was not very popular in France.

At the present time the method of technical instruction is far from perfect. The French Government sends young artists to Rome and to Athens; but these artists ordinarily undertake to study the monumental side of the ancient buildings, to draw out and reconstruct their outward appearance. One never sees them endeavoring to determine what was the interior arrangement of the dwelling-house in these two great cities, which were the most puissant sources of light to the ancient world.

The modern house in France is only a carricature of a house, and the author draws an unflattering sketch of it. "What profound ignorance," he cries, "of the arts of building, and heating, and ventilating and decorating. Wall-paper, imitation marble, bad painting,—these you style decoration; foul chutes for water-closets, humidity in every room, pure air nowhere,—this is your hygiene; unhealthful stoves, fireplaces that smoke and do not heat and are a permanent peril, furnaces which poison you,—these are your means of heating. Finally, a fair façade in stone is plastered over this void, and before this the constructer parades his ignorance." "It is time," he continues, "to rebel against this system, and declare war on typhus, diphtheria, small-pox, cholera and consumption, which are the consequences of the defective arrangements of our cities and of our dwellings, and which, in truth, were unknown to the Romans and the Gauls."

To justify his admiration for the life of the ancients, M. Boussard describes in the first part of his book the arrangement of a Gallic house. In the first place, heating was managed from the outside by means of the hypocaust. The space under the lower floor was unoccupied; piers placed a short distance apart supported the floor above; at the opposite ends were two openings which communicated with fireplaces placed in the court-yard. Flames and heat passed along the underside of the hypocaust and engendered an agreeable and equal heat. There was no smoke, no deoxygenation of the air, none of the phenomena which to-day render accidents so common. The smoke escaped by vertical flues wrought in the thickness of the walls, which flues were carried in the walls round about the rooms for the sake of increasing the temperature within.

For the want of space I cannot here dilate on the details of this system, but the author, who has experimented with it in two villas built by him, assures the reader that he obtained excellent results, and that the consumption of combustibles is relatively small. He perceives also the following advantage: With the present existing methods the heating apparatus does not come under the oversight of the architect. With the re-introduction of the Gallo-Roman method the architect once more becomes absolute master of everything relating to the construction of the house of which he is the creator.

The public baths were also heated by the aid of the hypocaust. Bathers first entered a gallery where they found attendants and paid the price of admission. Then they were directed towards the first room, to which came only waves of warm air, which served to prepare them for the transition as well from the outside within as from within out. This room contained, probably, gymnastic apparatus for the stimulation of the perspiratory glands. In the next hall the temperature was higher. Here the bather undressed, and the slaves carried off his clothes and hung them in a neighboring chamber. Next the bather passed into another room where the temperature varied between 25° and 30° Centigrade, greatly encouraging perspiration. In order to avoid congestions the slaves served the bather with a foot-bath, and stretched him on a marble couch. The time spent in this chamber amounted to a half-hour. Next he passed into a still hotter room, where the air was heated up to 40°, and if this temperature was not high enough to provoke perspiration, the bather was made to sit down in a marble arm-chair placed in the centre of two hemicycles heated up to 50° or 60°. He then passed back to the preceding room, where he was subjected to massage, after having been enveloped in a lather of soap, and, this finished, next plunged into a bath of cold water, or received a cold or tepid douche, according to taste, or the special treatment he was following. This description is drawn from the ruins of the Gallic baths at Verdes (Loir et Cher), and agrees sufficiently with all the notions which we have concerning the thermal baths of the Romans, who must have been the importers of the hydropathic tastes of the Gauls.

There have also been found and studied ruins of other interesting baths at Gennes (Sarthe), at Drevant, at Perrenou, at Jublains, at Cimiez, near Nice in the Maritime Alps; but one of the most complete systems of hypocaust found in France is that at Rhodez, the chief town in the Department of Aveyron. Nevertheless, I would, so far as the applicability of this system to modern construction, cite only with much reserve the opinion of the author. In a general way we are wrong to believe that the habits of the ancients, as we know them, can be applied to the society of our days, whose customs, methods and resources are so different from those of the vanished peoples. One too easily believes that the Roman habitation, whose internal arrangements have been reproduced on paper after close study of the remaining ruins, represent the common type of dwelling. These habitations were really palaces, and palaces can only belong to very wealthy families. The edifices which have not entirely disappeared in the cataclysms which have overwhelmed the races of the Greek and Roman world, can only be those which from their solidity, the excellence of their construction, and by the amplitude of their arrangement possessed the necessary conditions to survive in some degree the grand catastrophes of history; but these edifices do not give us an exact idea of the average comfort at the service of the society of those days. They generally belonged to patricians, and because we discover in them numerous traces of luxury and refined decoration, it is not proper to conclude that luxury was at that time within the grasp of everybody, and that the rules of hygiene and convenience, evidenced by these ruins, were generally followed. This error, which one cannot too often correct, has greatly contributed to give birth to the equally erroneous supposition that the ancients understood the science of hygiene better than we do. Surely if we compare the house of a modern workman with the plan of a villa of the time of Lucullus, for example, the advantage rests with the Romans; but it is certain that the public health was not then, as it is to-day, a subject of general preoccupation, and that on this head an average doctor knows to-day more than a senator of the time of Augustus, although there is a great deal in the way of progress for us yet to realize. The Roman dwelling, for example, had very low doors and few windows: air and sunlight, which are the most powerful health-giving agents, penetrated the building under difficulties. The interior division of the house was in no ways hygienic, and the construction of the privy vaults of the dwellings of the poor was very bad. The women and children were relegated often even in the most patrician palaces to the remotest parts of the dwelling. The gymnasia alone prove that our ancestors knew some of the essential conditions of health; but they practised hydropathy and delivered themselves up to bodily exercise through habit and taste, affectation and idleness, rather than under the influence of reason, while to-day the renaissance of gymnastics and the practice of hydropathy are the fruits of scientific deduction. Even in this we are their superiors, although there is much for us to do before the use of the douche and the passion for the trapeze are so generally a part of our daily life as the similar exercises were of the daily life of the Romans. We may admire these children of Romulus without seeking to imitate them in everything. As for the selection of sites for their towns, for instance, the Romans were less advanced than the Etruscans, who were their superiors also in the arts, in morals and in laws. The Etruscans always built their cities upon heights, so that they were dry, airy and protected from noxious miasms. The Roman cities, on the contrary, were built without precaution from the point of view of aëration, and the site selected for the foundation of Rome is a convincing proof of this. We must be on our guard against this Roman spirit in those things whose manifestations are not in harmony with modern needs. Europe dallies on the way toward progress precisely because Roman tradition still attaches it to the things of the past. America has marched with giant strides towards civilization just because she has known how to create her own customs and her institutions at a single stroke, and her real grandeur dates from the day when she banished slavery, which she inherited from the Spaniards, who in their turn received it from the Romans.

To return to heating, I consider that the hypocaust system has unquestioned advantages, and can be used in habitations of a single story occupied by small families. It could be scarcely adapted to large buildings of several stories, such as we see in modern cities, where the furnace in the cellar succeeds in satisfying all the conditions of a common and uniform source of heat. I question whether a hypocaust with vertical flues and the fire out-of-doors could distribute the desired quantity of heat in a house of six stories, for instance, unless the floor of the lower story was constantly at a white heat, in which case, in order to secure a decent degree of warmth for those in the upper story, it would be necessary to broil those who dwell on the ground-floor.

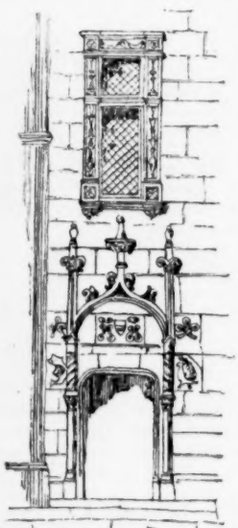
M. Boussard devotes several chapters of his book to the study of the materials employed in the Gallo-Roman buildings—the pavements, decoration and stucco and mosaic—and these chapters are not the least interesting in his book. I am sorry not to be able to give an abstract of them here, but this would lead me too far. We understand, moreover, that in whatever concerns solidity, ornamentation, veneering, the architects of that time were of great ability, as is testified by certain ruins.

It is time that we examined the Roman house in its entirety, in order to understand the way in which life was led within it. The Roman villas almost never had more than one story. With rare exceptions all the rooms were arranged about a central court. The floor was raised about sixty centimetres above the level of the ground. The framework supporting the roof was very elegant and light. The roof was formed of tiles absolutely identical to those half-round tiles which we use to-day, or the flat tiles fitted one to another by the aid of rivets. Glass was commonly used for the windows, for the garrets and the court-yard, and probably for the interior courts. The Romans understood glass-making, and if we have found only rare specimens it is because, as M. Boussard very wisely observes, glass oxidizes in contact with

moisture. The best morsels are those which have been found in enclosed spaces, that is to say, in tombs. They consist of phials and lachrymatories. It is certain that the Romans did not invent the process of glass-making. The Greeks already made it, according to Winckelmann, and used it for construction and certain domestic purposes. The Etruscans also had knowledge of this industry, and from them probably, rather than from the Greeks, the Romans learned it: certain Etruscan museums contain objects of much interest from this point of view. In that at Orvieto, I have seen, for instance, a small glass phial, black threaded with white, which proves not only that the Etruscans made glass, but that they worked it with much ability and refinement, for the phial at Orvieto presents many points of resemblance with the product now turned out of the celebrated glass-works of Murano at Venice, from which we can conclude once more that "there is nothing new under the sun." The blue glasses of Pompeii, set off by enamel on a white background representing vine branches and figurines, prove that for eighteen centuries this industry has rather retrograded than advanced; for the Pompeiian relics are far more artistic than the best modern products of the workshops at Ravenna. We know, also, that glass-mirrors were in common use at Rome — so common that persons of distinction preferred them to plaques of polished metal. H. Mereu.

[To be continued.]

SPONTANEOUS COMBUSTION.



Chateau du Rocher à Mézanger France.

In November of last year a force of men was sent aboard of the "*City of Newcastle*" to extinguish a fire in a cargo of cotton which had been generated by spontaneous combustion. An unsuccessful attempt to extinguish the fire had been made at Queenstown, the first port at which the vessel stopped.

Baled cotton and also cotton and fibres and rags that are saturated with oil are quite subject to spontaneous combustion. In five years forty-six ships bound for Liverpool alone and loaded with cotton were burned either at sea or just before or after their departure. This figure is much too low, judging from the remarks of a rich English banker who is familiar with affairs in all parts of the world. Of the long list of vessels laden with cotton or grain, nine had just been burned in whole or part, and he added that it was necessary that steps should be taken to prevent the fermentation of cotton, which appeared to be more combustible at that period than usual.

The remarkable tendency which is observable in tissues and cotton when moistened with oil to become heated when oxidation sets in, deserves particular attention, and especially so from the sad results that may follow negligence, caused too often by ignorance of the danger or ignorance of the necessary precautions. In the navy, for instance, every precaution is taken to avoid spontaneous combustion. Thus, all the officers are aware that before packing away the tarpaulins or oiled coats which the sailors wear in bad weather, it is necessary to see that they are thoroughly dried. They should not be packed together in too great numbers. Oils, when drying, undergo a change which is simply a slow combustion at low temperature. If this action is hastened by any cause whatever, it brings about a higher temperature, which may result in fire.

The experiment may be made by producing spontaneous combustion, even in a few yards of cotton cloth, by painting it with linseed oil. M. Chevalier cites an instance of this nature in the sail-room at the arsenal at Brest, where three cases (for sails) of canvas painted with oil had been laid one on the other, after having been dried in the sun two days. Each piece measured about ten yards. Whether in the sun or shade, or under cover or exposed to the air, these pieces of fabric, whether yarn or cotton, can readily take fire, but fortunately very soon attract attention from the dense smoke that is emitted. Cotton fabrics containing oil, however, do not alone take fire in closed chambers and in the holds of ships, for I have seen the phenomenon produced in open air. I witnessed a case in point near the railroad station of l'Ouest, in July, 1878, when the heat was very great. The lamp-room is situated at the foot of the Rue de Rome and the Pont de l'Europe. There, in a large sack, were gathered all the useless, greasy rags that had been used for cleaning the lamps. One of these bags had been filled so full that the rags had fallen to the ground, and as I passed by I noticed an odor of burning rags, but after a careful examination, discovered no cause for this. Passing the same place five minutes later, I found the odor stronger, and I discovered the rags were just bursting into flame. I called an attendant and showed him the fire, and it was very soon extinguished with the help of a pail of water.

M. Chevalier, in his memoir on fires, instances the experiments of Messrs. Golding & Humphries, who caused spontaneous combustion by shutting up a piece of fabric immersed in linseed oil in a closed box, where it was left for three hours. The fabric commenced to smoke and as soon as the air was admitted burst into flame.

Messrs. Renouard and Rouen carried still farther the experiments of Golding. They mingled a few pieces of oiled cotton cloth with some dry cotton, and then put the whole under pressure, and after a few hours fire was discovered. Every one is aware that when cotton is baled, it is subjected to an enormous pressure. If the cotton is greasy or even damp, it ferments, becomes heated and then ignited.

A curious instance was reported by Dumas to the Institute in 1844 and cited by M. Fonssagrives. An artist was rubbing with a wad of cotton a painting freshly varnished. When he threw the cotton away, it immediately took fire in mid-air. Later, at the Academy of Sciences in 1879, during a discussion concerning a fire in the floor of a laboratory of a certain botanist, M. Cosson, M. Dumas cited a number of cases which prove that the condensation of the air in porous and combustible bodies frequently produces combustion if the temperature is sufficiently low. Among these he again cited the case of the wad of cotton taking fire in mid-air. A savant as prominent as Dumas, who repeats the same statement at an interval of thirty years, classes it evidently as an indisputable fact. The temperature of 80° or 100° in the hold of a vessel does not sufficiently explain the cause of a fire in a cargo of damp linen, hemp, manure, oats, grain or cereals. It is necessary to take into consideration the changed conditions. The rise in the temperature is due to the condensation of gas and to the rapid and powerful oxidation. Thus charcoal, which is very porous, when shut in a closed atmosphere, absorbs a large proportion of gas, which condenses and produces heat.

I cite another case not so well known: The waste from vulcanized rubber, when thrown, in a damp condition, into a pile, takes fire spontaneously. This occurred at the factory of M. Menier, at Grenelle, in France.

Messrs. Dumas and Chevreul, in treating of this subject of spontaneous combustion before the Institute, stated that when a package from China containing some fresh vegetable matter and some dried substances was opened, they took fire even before their eyes.

M. Fonssagrives states that the temperature of boxes of figs from Barbary has been so raised by fermentation that you could hardly bear your hand upon them.

There is less surprise in the increase of heat in heaps of coal, whether in storage or in open air. These masses of coal, whether in the quay or in the yard, take fire, nevertheless, without a spark being applied. The complex composition of coal gives a sufficient cause for spontaneous combustion. It contains essential oils, sulphur, and above all, phosphureted hydrogen and marsh gas, which is spontaneously combustible. The impalpable coal-dust also adds another danger of combustion. — *La Nature.*

THE LATE FELIX O. C. DARLEY.

Eagle des. for Napoleon I by C. Normand — after Raguenet.

FELIX O. C. DARLEY, says the Philadelphia *Telegraph*, who died at Claymont, Del., yesterday, was born in Philadelphia, June 23, 1822. His taste for art and an inclination to make it his profession, were shown in his boyhood. At fourteen he was placed in a mercantile house in the hopes that his thoughts might be diverted into another channel. But the kindling fire of genius happily was not thus to be extinguished. Viewing with positive distaste the routine of the counting-room, he spent his spare moments in drawing, in which he made rapid improvement. The subjects that first interested him were figures of firemen, and other types of city life. In these he displayed so much originality and artistic power, that he was offered a handsome sum for them, and advised to rely wholly upon his pencil for support. The dream of his young life seemed about to be realized. With joy he gave up his mercantile occupation, and devoted himself to art. During several years various large publishing houses at Philadelphia gave him constant employment in making designs. His work showed continual improvement, and received praise from critical judges. These delineations had the merit of vigor, humor and great faithfulness to life and character. A series which was published about this period had much popularity in the Southern and Western states.

In 1848 he removed to New York City. Here he found employment in illustrating Irving's "*Sketch Book*," his "*Knickerbocker's*

History of New York," and other publications. The inimitable descriptive and humorous powers of Irving were never more vividly presented than in the illustrations by the now practised pencil of Darley. He also made a series of designs in outline from Judd's novel of "*Margaret*," without any definite intention of publishing them. They were seen, however, by the Committee of the American Art Union, in New York, at that date a flourishing and influential institution for the advancement of art, who at once gave him a commission to illustrate Irving's "*Rip Van Winkle*," for distribution among the subscribers. He made six drawings, which were much admired. During the following year he completed another series, illustrating Irving's "*Legend of Sleepy Hollow*." These drawings were largely circulated, both in the United States and England, and placed their author in the front rank of American designers. It was admitted that no modern productions, in either country, were superior to them in any particular. In 1856 his illustrations of "*Margaret*" were published in New York, in a folio edition, and were very successful.

Subsequently he turned his attention to the preparation of vignettes for bank-notes, and much of this beautiful work was executed by him. Still later he undertook the illustration of the works of Cooper in thirty-two volumes. This book embraced no less than five hundred sketches, and he devoted to it the full grasp of his artistic mind and skill, with marked success. He has thus forever linked his genius and name with that of the greatest American writers. A large copy in crayon, representing the death of Scipio, was in the exhibition of the American Academy in 1858. His drawing of the "Massacre of Wyoming," and others, relating to American Revolutionary history, are spirited and beautiful pictures, some of which are seen in almost every house in the land. He contributed various designs for Irving's "*Life of Washington*." An illustration from Longfellow's poem of "*The Courtship of Miles Standish*" was published in New York in 1858–59 in photographic form.

In 1859 he married a daughter of the late Warren Colburn, the eminent mathematician, and removed from New York to Claymont, Del. Besides his work on the volumes of Cooper, he illustrated the works of Dickens. His illustrations of the text of the latter in humor and expressiveness will compare favorably with any of the illustrations made by the most celebrated English designers. He made a series of four drawings for Prince Napoleon, at his request when in this country, which received the unqualified praise of that person.

In 1865 Mr. Darley made a large composition of "Sheridan Checking the Retreat near Winchester," for Mr. Hatch, of New York, also two pictures in oil for the same gentleman, one of which, "Going to the War," was engraved in line by Rice, and published. About the same time he produced another large design, entitled "On the March to the Sea," which was engraved by Ritchie, and published by L. Stebbins, of Hartford. During the War he made for Mr. Williams S. Blodgett, a wealthy manufacturer of New York, two large compositions, "Dahlgren's Charge at Fredericksburg" and "Foraging in Virginia," both of which were published in photograph. All of these pictures relating to the War have become famous. In historical accuracy of scene and person, in graphic delineation, and in artistic study and delicacy, they are well worthy of the partial judgment which educated criticism as well as popular favor has awarded to them.

Mr. Darley visited Europe for the first time in the summer of 1866. This afforded him a long-desired opportunity for making sketches of various people and places abroad. During a term of thirteen months he travelled extensively, and used his pencil with his accustomed skill. On his return, his letters and sketches were published in a volume, under the title of "*Sketches Abroad with Pen and Pencil*." While in Rome he made a number of studies in water-colors of the models, and produced two or three compositions in the same medium for private collections. Within the last ten years he made a large number of less important drawings than those enumerated. The leading publishers looked to him, to a great extent, for the higher style of designs for standard works.

Mr. Darley passed a life of diligent application to his profession rather than taking any exciting part in the world's affairs. "I have neither met with accident nor adventure of any kind," he once wrote, "mine has been neither a strange nor eventful history. My summers have been generally given up to the sports of the field — shooting and fishing — for which I have a weakness." He was a thorough lover of Nature, and a worshipper of the beautiful in all its forms. His skill in art was in a very limited degree mechanical, but it was inspiration coming from a keen sense of the teachings of Nature, and the suggestions of individual character and habits.

The productions of Mr. Darley have been submitted to the most cultivated criticism of his own country and of Europe. His peculiarities have been found to be advanced ideas in artistic taste, and his powerful and original conceptions have shown a remarkable blending of the truth of Nature with the advancement of imagination. His pictures are images of the natural, and at the same time, new creations of fancy. The scene and the persons are so exact that they are the reproduction of life itself, but they are equally expressive of the brain and hand which have delineated them. In a word, Darley was not only a great artist, but he was so strikingly original that he is neither an imitator, nor can he be imitated.

His outline drawings to Judd's "*Margaret*" gave him a reputation nearly as great as that of Moritz Retzsch. In 1879 he appeared with a work that won at once the highest admiration. This was his series of twelve "Compositions in Outline from Hawthorne's Scarlet Letter," in which a wonderful realism and weird ideality are combined with much power. Many will remember his illustrations of the life of an American farmer, in his drawings of the seasons for "*Appleton's Almanac*." Mr. Darley was of a noble and lovable character, full of earnest aspiration and faithful endeavor to accomplish his best work, but with remarkably little of mere personal ambition.

MONUMENTAL USE OF BRONZE IN JAPAN.

WHILE in the service of the Government of Japan some years ago, says Mr. R. Henry Brunton, in the *Journal of the Society of Arts*, I was kindly furnished, by one of its oldest officials, with what he assured me was reliable information regarding old Japanese bronze images. These are remarkable alike for their enormous proportions, the method of their construction, and the excellent character of the alloy composing them.

A very wonderful specimen known as "Daibuts" is situated about seven miles from Yokohama, and being within treaty limits, is visited by every visitor to Japan. But the largest and most remarkable bronze image in Japan is placed at Nara, some miles eastward of Kioto, or Sai Kio, as it is now named, and this has been seen by but few foreigners. An image on this site was first erected in the year 743, but it and a subsequent one were destroyed during internal wars. The present image was erected about the year 1100.

Its dimensions are as follows: —

Height of figure (sitting posture)	53.5 feet.
Length of face	16.0 "
Width of face	9.5 "
Length of eye	3.9 "
Length of ears	8.5 "
Width of shoulders	28.7 "
Length of palm of hand	5.6 "
" middle finger	5.0 "

On the head there are 966 curls. The image is surrounded by a glory, or halo, seventy-eight feet in diameter, on which sixteen images, eight feet long, are cast. Two smaller images, each twenty-five feet high, stand in front of the larger one.

The total weight of metal in the main figure is about 450 tons, and this is said to consist of the following: —

	Pounds avoirdupois
Gold	500
Tin	16,827
Mercury	1,954
Copper	986,080
	1,005,361

In considering the reliability of the above figures, it may be borne in mind that they were furnished to me by a Government official from Government records, but that, apart from the respectability of their source, I have no confirmation of them.

The large images are not cast in large pieces, but are built up with a multiplicity of small pieces of irregular shape, which are cemented together by a compound known to the natives as *kandaru*, the composition of which I have not been able to discover. As illustrating the excellence of this cement, I have closely examined this large image, and could not discover any softening or signs of decay at the joints. Further, the cement has taken on the same tarnish as the bronze, and the joints are therefore not observable except on close inspection.

The images are in the form of Buddhist deities, and from whatever point of view they may be regarded, whether artistic or merely mechanical, they are interesting examples of isolated and early skill.

PROGRAMME FOR THE EXAMINATION OF CANDIDATES FOR THE ROTCH TRAVELLING-SCHOLARSHIP.

Boston, Mass., April 7, 1888.

PROBLEM IN DESIGN — A CASINO FOR BATHS.

THIS establishment situated upon the new Charles River Embankment should provide ample accommodations for plain and medicinal baths, and offer to a luxurious public such comforts and recreations as may make it a fashionable resort. To this end there should be joined to the bathing department a well furnished gymnasium with tennis-court and bowling-alley, a large reading-hall, billiard-room and a café in which light refreshments may be served. Directly upon the river must be a boat-house, and one or two pavilions for use in hot weather and for watching races. Porticos connecting these outlying buildings can be glazed in winter to give sheltered and sunny walks. The grounds should be rendered as attractive as possible.

The department of baths should provide for a large swimming-bath, twenty-five bath-rooms, twelve douches, separate accommodations for the Russian and Turkish service, dressing-rooms, lockers, water-closets, etc.

There must also be an apartment for the family of the medical-director, as well as consultation-rooms for his use. There must be lodging for twelve employés.

The buildings will be heated and electricity generated by a powerful engine. A strong light must be thrown upon the water to permit rowing and boating parties after dark.

The depth of lot is five hundred feet; its river-front is not limited

The preliminary sketches must clearly indicate the scheme proposed, by a plan and elevation to a $\frac{1}{32}$ scale.

The finished drawings, required to be brought to the Museum of Fine Arts on April 23 at 5 P. M., are:

One plan on a $\frac{1}{16}$ scale.

An elevation towards the river with cast-shadows on a $\frac{1}{16}$ scale.

A perspective on an imperial sheet.

A section on a $\frac{1}{16}$ scale.

This set of drawings must be accompanied by a thesis, explaining the architectural character of the design.

Too great a change in the finished drawings will throw a design out of competition.

Examinations will be held at the Museum.

The different subjects will be marked on the following basis:

French	15
History	15
Free-hand drawing	15
Construction	30
Design, including thesis	100

COMMUNICATIONS

BOOKS.

Springfield, Ill., April 2, 1888.

To the Editors of the American Architect: —

Dear Sirs, — We noticed in an editorial of the *American Architect* of March 24th, two architectural works spoken of, one being Mr. Wightwick's "*Hints to Young Architects*" and the other being Mr. J. T. Micklethwaite's "*Modern Parish Churches.*" Can you inform us where they can be bought and state to us the cost price of each if you have any means of obtaining such information. In so doing you will greatly oblige us.

Very truly yours, Bullard & Bullard.

[There are several different editions, American and English, of the "*Hints to Young Architects,*" varying in price from a dollar and a half to three and a half. Micklethwaite's "*Modern Parish Churches*" must probably be ordered from England, and will cost here about three dollars. Sabin & Sons, Nassau Street, New York, or Estes & Lauriat, Boston, will procure them at as low rates as possible. — Eds. American Architect.]

WHO PAYS THE CONSULTING-ARCHITECT?

To the Editors of the American Architect: —

Dear Sirs, — Will you please advise me as to the accepted practice in regard to the compensation of *consultiny architects.* Are they usually paid a percentage separately and in addition to the list charges made by the regularly-employed architect, and if so what is the rate? Or must their compensation be a division of these list charges with the regular architect? My feeling is that the regularly-employed architect earns his full compensation irrespective of the advice and assistance afforded by the *consulting* architect, but I wish to have an equable and just basis upon which to arrange for this class of work in the absence of any special agreement covering the case. An early reply will greatly oblige,

Yours respectfully, P.

[We cannot say what the general practice is in such cases and doubt if there is any rule. If the owner chooses to go to a consulting architect to get a comparison of opinions on a difficult point or to assure himself that the one he has already employed is doing his work well, we see no reason why the latter should pay any part of the expense. Consulting physicians and associate counsel are always employed at an extra charge, and an architect's relation to his client may be fairly regarded as being just about midway between that of physician and counsel. If, however, the architect himself wishes to supplement his knowledge, in responsible undertakings which fall strictly within his province, by ascertaining the experience of others, he will, under many circumstances, prefer to do so at his own expense. — Eds. American Architect.]

NOTES AND CLIPPINGS

A New Water-supply for Paris. — It is well known that Paris is not well provided with regard to drinking water, having to draw its chief supply from the upper course of the Seine and the Canal de l'Ourcqe, branching off from the Marne. A Swiss engineer, Herr Ritter, has submitted to the Paris municipality a plan by which the city may be furnished with an ample supply of water from an inexhaustible source — the lake of Neufchâtel, Switzerland — at a cost of 300,000,000 francs, or £12,000,000. This heavy outlay would, however, be covered after construction by a safe revenue for interest and amortization. Herr Ritter is an engineer who has established his reputation for the construction of water-works, and the success attending the works he erected at La Chaux-de-fonds has encouraged him to make the proposal in question to the Paris municipality. Some time ago another engineer, M. Beau de Rochas, proposed to furnish Paris with water from the Lake of Geneva, at a cost of 500,000,000 francs, but the scheme was not accepted, probably on account of the great expense. Herr Ritter is more moderate in his estimate, and there is a probability of its being accepted. The principal details of the great undertaking are given as follows: The distance between the lake of Neufchâtel and Paris is 312 miles, and the surface of the lake is 1,620 feet higher than the mean level of Paris, its total area covering 350 square kilometres. This vast body of water, even if it were not replenished, would be sufficient to supply Paris for two years at a rate of 132 gallons per head per day, the level of the lake falling no more than three feet, and the water, which would flow with a speed of rather under 100 feet per second, would arrive at Paris at a temperature of 50° Fahr. But a lowering of the level of the lake is not to be thought of, for the lake has tributaries yielding a larger supply of water in the hot season than in winter. Herr Ritter does not intend to take the water from the surface of the lake, but to draw it off, as is done in the case of Chicago from Lake Michigan, by an underground heading 262 feet below the surface of the lake, where it has a temperature of only 43°. The water would be taken through a tunnel twenty-two miles long under the Jura Mountains to the Dessoubre Valley, in the Department of the Doubs, and thence in an arched conduit along the slopes of the hills to Paris, where it would arrive still at an elevation of 394 feet. As the present reservoirs of Paris have an elevation of only 295 feet, raising the fall, or pressure, by 100 feet, with a flow of 4,400 gallons per second, would give a tremendous motive power. Herr Ritter has calculated that in this manner Paris could be furnished not only with an illimitable supply of excellent drinking water, but also with the electric light in all the streets and water-power in all the workshops at a reasonable price, independently of the advantages accruing to the districts through which the conduit would be laid, and which could also draw their supplies from the same source. Herr Ritter estimates that it would take six years to complete the works along the whole line. — *London Morning Post.*

Our Small Army our Greatest Blessing. — Sir Lyon Playfair in *Contemporary Review* for March says: At the present moment the United States has 250,000 inventions protected by the patent law. This activity of invention shows ability and intelligence among her people, who are always ready to turn to account the forces of nature for the benefit of man. This country in her workingmen is rich in producers, and if their intelligence were trained in connection with their work, she need not fear the industrial competition of any European nation. All great foreign nations, except the United States, are terribly handicapped in the industrial race by excessive armaments. England is also weighted, but not to an equal extent. The strength of nations consists in peace, but they make a sad error by not knowing that the weakness of nations is in active war, or excessive preparedness for it. France, Germany, Holland, Italy, Belgium and Great Britain have 2,200,000 men withdrawn from being productive citizens, in order to be protective militants, at a cost for each man of £45. If we take all the civilized nations, adding the reserves to the permanent forces, fourteen and a half millions of the strongest men are or may be withdrawn from production. This is one man for twenty-four of the population, or, if we exclude the reserves, one out of eighty-one. That is the reason why I point to the United States as the great industrial nation of the future, for her armed forces represent only one man in 1,610 of the population. Luckily, her protection policy is an incubus upon her industry, and gives us breathing time to prepare for the coming struggle.

A Girl of Grit. — An old-fashioned Yankee of Quaker stock, who ran a small shoe-factory, indulged in a theory that nothing could pry out of his mind that a moral wrong was somehow perpetrated upon the community at large if a woman were allowed to earn above a stipulated sum each week. As his help was paid by the piece, and he had to keep tally in the main with current prices, he found this hard to manage at times. The swiftness of one young woman especially troubled him greatly. She would persist in running financially ahead of the others. At last he made a special cut-down in her prices, and told her why he did it. She gave him a baleful glance, tightened her lips and went on working. By Saturday night, despite the cut-down, she made ten cents above the week before. Another week went by, when he cut her down still more. The damsel still proved game and rose to the occasion. After a week or more the Quaker conscience grew "scared" and he asked her what she meant. "It means," said the girl, "that you may keep on and I'll keep on till you have a corpse on your hands in this workroom, for I'm grit and you can't conquer me!" The race ended there, and the girl was allowed normal pay. — *The Boston Record.*

A Town Bombarded by Ice. — The following reaches us from Archangel: On a little peninsula which juts out into the bay of Kandalak is a fishing village called Kashkaransy. At 4 o'clock on the morning of January 5th, the fisher-folk were awakened by a strange, dull noise, which suddenly changed into a succession of loud, cracking sounds, like the firing of guns. The people sprang out of bed and rushed from their huts to see a wonderful and dreadful sight. The wind had risen and, on the northwest side of the peninsula, the sea was driving the ice against the land. Great masses of ice were tumbling about on the surface of the water, and then raised on the crests of the heavy waves, dashed with irresistible force and a roar like thunder, against the village. The breakwater, that had always hitherto effectually protected the shore from the fury of the sea, was like a toy against the miniature icebergs which were hurled over it against the village beyond, tearing the houses up from their foundations, and wrecking everything that lay in their way. The peasants managed to save their lives and those of their cattle by flight, but all their dwellings and property were completely destroyed. — *London Globe.*

Harbor Improvements in Buenos Ayres. — A description is given in the *Annales des Ponts et Chaussées* for January of the plan of harbor improvements at Buenos Ayres so long delayed by political and financial difficulties. The Argentine Congress has approved Engineer Manero's plans and voted $10,000,000 for the construction of a new

port, the work on which is already commenced, and which will consist first of a canal 100m. (328 feet) wide and 6.4m. (21 feet) deep below low-water level, prolonging the Balisas River for the entrance of large ships; a basin of the same depth will be constructed for vessels remaining but a short time, and four other docks or basins also of the same depth, whose quays will have a total length of 8 kilometres (26000 feet); finally, a maritime basin of equal depth and 1,430m. (4,692 feet) long will be made. All the masonry will be of béton blocks. Separate storehouses will be built for imported and exported goods, which will occupy a total area of 1,000m. (3,280 feet) by 50m. (164 feet), and have a capacity of 315,000 cu. m. (10,963,900 cu. feet). All the quays will be provided with loading and unloading appliances, cranes and derricks.

The Explorations at Paphos. — What will be the first find in these new excavations at the ancient home of the Love-goddess? Will it be anything to rival or even approach that Praxitelean Venus of the Vatican which the present pope has just stripped of its envious tin draperies — worthy to have been inscribed with a legend recording them as presented not "*munificentiâ*," but "*pudicitiâ*," Pii Sexti, and which he has just presented to the admiring world of art in its surpassing and immortal beauty. Perhaps, to use a homely expression, there is "no such luck." Yet, it will be hard if some choice works of art are not brought up from beneath that silent silt of ages. A temple of such world-wide fame and sanctity, a shrine which probably dated from long before the "great period" of Greek art and which endured until long after that period had passed away, ought surely to have been rich in curious offerings; and such tributes, when they dated from a brilliant artistic era, must sometimes, at any rate, reflect the beauty which was the birthright of their time. If the Venus of Praxiteles could find its way to the temple of the goddess at Cnidus, and not only survive to extort the admiration of Lucian, who had been brought up to the sculptor's art, and "knew a thing or two" in statuary, but live on for another seventeen hundred years to be the wonder of our own generation in the eternal city — if these things are possible, we say, at Cnidus and at Melos, and at other sites of the goddess's temples, why not at the greatest of them all? For it must never be forgotten that at no other place in which shrines dedicated to Venus may have been found would bear comparison in point of religious dignity and solemnity with that which we are about to explore. Paphos was to the goddess what Lemnos was to her limping husband, an island specially and emphatically sacred to the respondent, if we may so describe her without offence, as the other was to the petitioner. The "innamorata" of Mars not only resorted to Paphos as a pleasant place of abode, but she retired to it in circumstances of difficulty, for it is thither, if we mistake not, that she withdrew in divine confusion on that unlucky day when Helios condescended to the part of a private detective and Olympus was agitated by one of the greatest scandals which ever shocked its not excessive moralities. Paphos was to Aphrodite what Delos was to Apollo, or Cyllene to Hermes, and to offer up homage to her at this her favorite shrine was a good work, far more likely to result in benefit to the doer of it than the rendering of worship to the goddess at any other spot in the world. The temple must have been singularly rich, and there has been no Verres to plunder it. Nothing, probably, but the wasting touch of time and the neglect and contempt of Turkish rulers for all religions and religious places but their own can have conspired to rob Paphos, or rather, Kuklia, of its art treasures, and these should certainly, therefore, have left some survivals behind. — *London Telegraph.*

Almost frozen in Bitumen. — A singular and at the same time serio-comic accident lately happened to a Paris watchman named Parnot. Parnot was employed near the Champ de Mars to look after some buildings which were in course of construction, and in order to keep himself warm during the night he put some planks over a cauldron of boiling bitumen, and, covering himself carefully up, went to sleep on them. During the night the planks gave way by degrees, and the man slid gently into the bitumen. Under normal conditions he ought to have been boiled, but the bitumen was just beginning to feel the effects of the frost, and so the watchman was saved from a horrible death. Unluckily, however, the bitumen before thoroughly freezing had adhered to Parnot's clothes and flesh, and about 4 o'clock in the morning he was awakened by cold which seemed to have entered the marrow of his bones. On endeavoring to get up, he found himself glued to a bed of adamant, and shouted energetically for help. His cries attracted some matutinal marauders who were prowling around the locality for plunder, and these worthies, instead of helping the unfortunate man out of his bituminous bed, eased him of his watch, a purse containing a small sum of money, and his knife, after which they indulged in unseasonable chaff as to his inability to "rise with the lark," and finally left him to his fate. Parnot was nearly frozen to death when the workmen arrived in the morning and extricated him from his perilous position. He had to be admitted to the hospital as an urgent case, for not only were his feet frozen, but he had seriously injured himself in his energetic but ineffectual endeavors to rise. — *Boston Herald.*

Statue of Liberty on the Washington Capitol. — Mr. Jefferson Davis writes to the New York *World* that Sculptor Crawford had nothing to do with the statue on the dome of the Capitol at Washington, and adds: The facts, as my memory serves, were briefly these: An order was accepted by Mr. Powers to make a statue for the dome of the Capitol. His cartoon represented a female figure with a "Liberty cap" on her head. I objected to the "Liberty cap" as the accepted emblem of the freed slave, at the same time stating that our people were born free and had maintained their freedom. Mr. Powers modified his design, substituting for the cap a crown of feathers, as indicative of our aborigines, by which he thought to render the figure typical of America, as the representative of which the statue was intended to stand. I do not remember what, if any, other modification was made. The only objection offered by me having been removed, the design was accepted and the work executed by the renowned statuary Powers.

The Third Artesian Well near Paris. — The artesian well which has been in course of construction at the Place Hébert, Paris, for the past twenty-two years has just been completed. The water-bed lies at a depth of 719m. 20c. from the surface of the soil. Paris now possesses three artesian wells; viz., at Grenelle, Passy and the Place Hébert. — *Exchange.*

TRADE SURVEYS

A general scaling down of railroad freight rates seems to be one of the probabilities of the early future. One of the remote causes which have made this a necessity, is the decentralizing influences that have been at work during the past five years in our industries. Statistics show that in Illinois, the manufactured products have increased 50 per cent within that time. In Iowa, 30 per cent, and in other Western States the increase has been from 15 to 40 per cent. Manufacturing establishments have been multiplying. The construction of railroads throughout the West and Northwest has drawn thither a vast amount of capital, enterprise and labor, and the resulting industrial developments have created new necessities with which railroad companies have to deal in the way of fixing rates. This necessity has been emphasized by the Interstate Commerce Law, and by the establishment of substantially new commercial and financial centres in the far West. Then, again, the growth of commercial organizations of one kind and another, such as Boards of Trade and labor associations, the development of competition from new sources of supply and the possibility of a further lessening of transportation rates by inland water-routes and increased lake-craft, all converge into the necessity for a rearrangement of transportation rates and rules for their control. The chief interest to business men throughout the country in this tendency is, that it will probably result in permanently lower traffic charges. The outflow of Eastern capital into the West, has given Western enterprise a leverage and potential capacity which will place it in a position in a very short time, to be very largely independent of the Eastern sources of supply. Fuel is declining in price throughout the West. La or is relatively cheaper than it was three years ago. Material and machinery are lower. All these influences are attracting manufacturing enterprise, not exactly from the East to the West, but are stimulating local manufacturing enterprise throughout the West, as has been done on such a large scale throughout the South in the past five years. The Long and Short Haul Clause is helping this decentralizing industrial policy. These general considerations have been referred to for the purpose of attracting attention to the new and favorable influence at work throughout the newer States of the West, and that is the development of a self-supporting capacity, to furnish manufactured products and merchandise of all kinds. The people of the far West, instead of sending to Boston for shoes and to the East for textile goods, or for special machinery, paper, hardware and a host of products, the manufacture of which, the New England States have monopolized to a considerable extent, will establish industries of these kinds among themselves. The effect of this departure will be the building up of large industrial communities similar to those we have in the East. The building of shops, mills, factories, houses and of machinery establishments, large and small, will grow out of this expansion. The manufacturers of the Northwest have observed this movement for a year or two, and they have been wise y preparing for it by an extension of purchases of timber-territory throughout Michigan, Wisconsin, Canada, and in Kansas and Arkansas, and throughout the lumber regions east of the Mississippi River. Coal-producers have been preparing for it by purchasing valuable coal-deposits throughout the Northwest and West, wherever they are to be found. Oil and natural-gas projectors have been scouring the region west of the Mississippi for evidences of oil and gas, and have been spending considerable money in boring. The demand for lumber all over the West has been increasing in a remarkable way during the past year. Building enterprise is moving ahead steadily. In some localities it has assumed booming proportions. Towns unknown to the maps are growing in population, and there is a demand for all kind of building material in the vast region of country between the Mississippi and Rocky Mountains. Travelling agents for manufacturing establishments who have been making pioneer tours through these regions return with rather enthusiastic reports as to the possibilities of that section. Business may fluctuate in the East, but it will improve there. Iron-making may suffer in Pennsylvania, but it will grow rapidly in Alabama. Wool-growing may suffer in Ohio, but Texas will gain. Money-lending in New York may be unprofitable, but the demands from Western sources will offset the dulness in the East. Industries may suffer depression in the New England and Middle States, but there will be a compensating expansion West. House and shop building may progress rather slowly in the older section, but in the new West and South, there will be such a demand for material, capital, enterprise and labor, as will sustain a healthy activity throughout the country. The actual trade conditions can be summarized in a very few words. Manufacturers everywhere are purchasing cautiously. The boot and shoe manufacturers of New England are still ahead of last year. Hardware manufacturing establishments are full of orders, and have excellent prospects for the season. Cotton-mills are nearly all running full time. The woolen manufacturers expect to be busy during the last seven months of the year. Makers of machinery are nowhere complaining of restricted orders. The iron trade is suffering from dulness and low prices. The distribution of lumber throughout the East is very heavy. The makers of all kinds of railroad equipments and supplies are pretty full of orders; the locomotive-works being particularly full. The car-builders are unable to accept all the orders that are presented. The smaller industries throughout the country are suffering from a slackening demand, but there are evidences that within the next thirty or sixty days a better condition of things will prevail. Western factories and shops are working to 80 or 90 per cent of their capacity. Commercial failures are fewer than last year. There is a tendency on expansion of credits among jobbers and shippers in all branches of trade. No financial stringency is felt in markets East or West. An honest difference of opinion exists as to the wisdom of pending measures in Congress to maintain an easy volume of money for business requirements. The interests of the producers throughout the country are being watched with greater care than ever before in our history. Speculators and manipulators of stocks have less opportunity than ever before. Government stands ready to extend its paternal assistance, if necessary, against trusts and monopolies, which have proved too strong for outside enterprise. The interests of the mass of the people were never more assiduously conserved, and there is no reason for predicting evil or injury to them.

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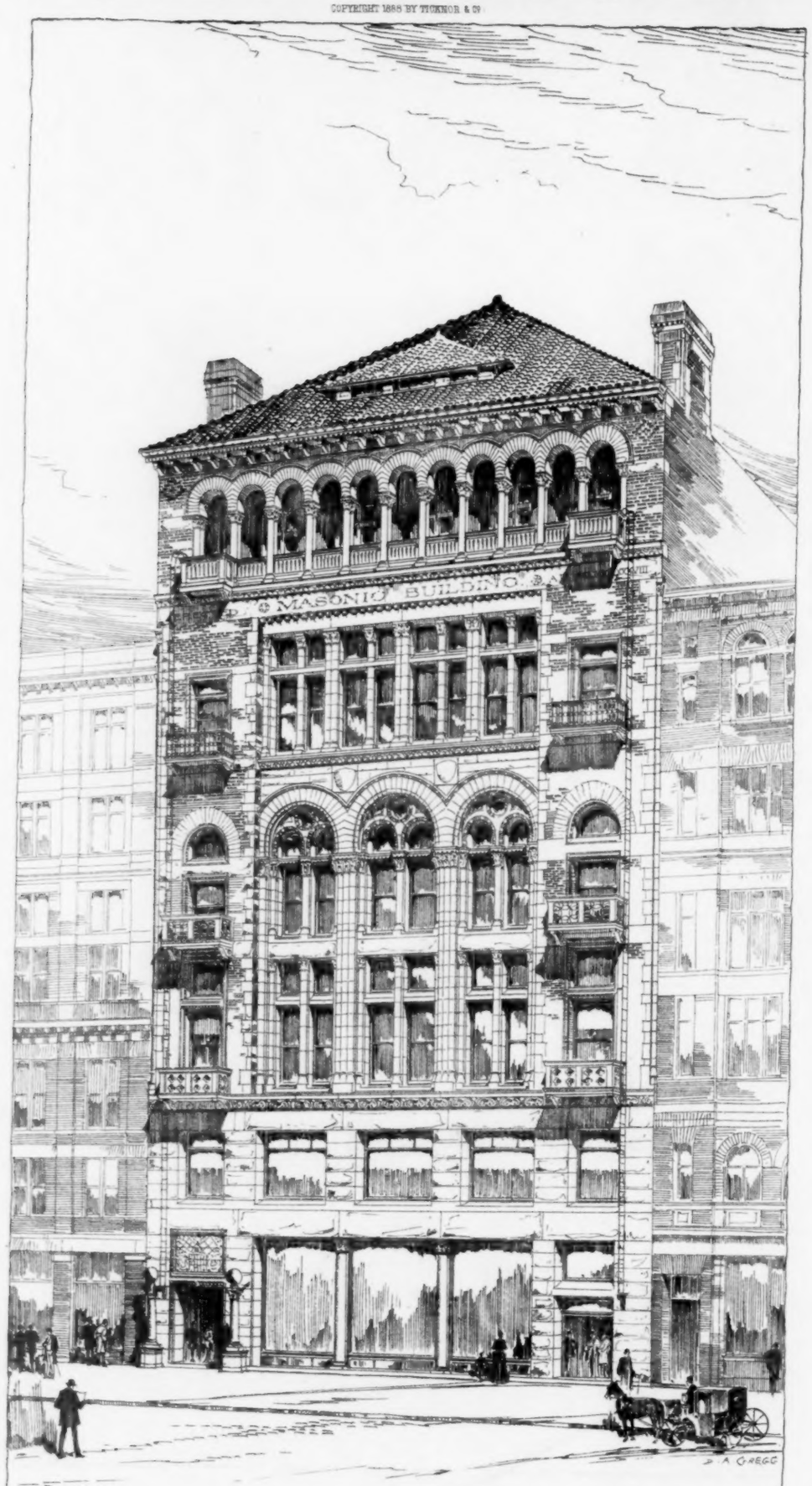

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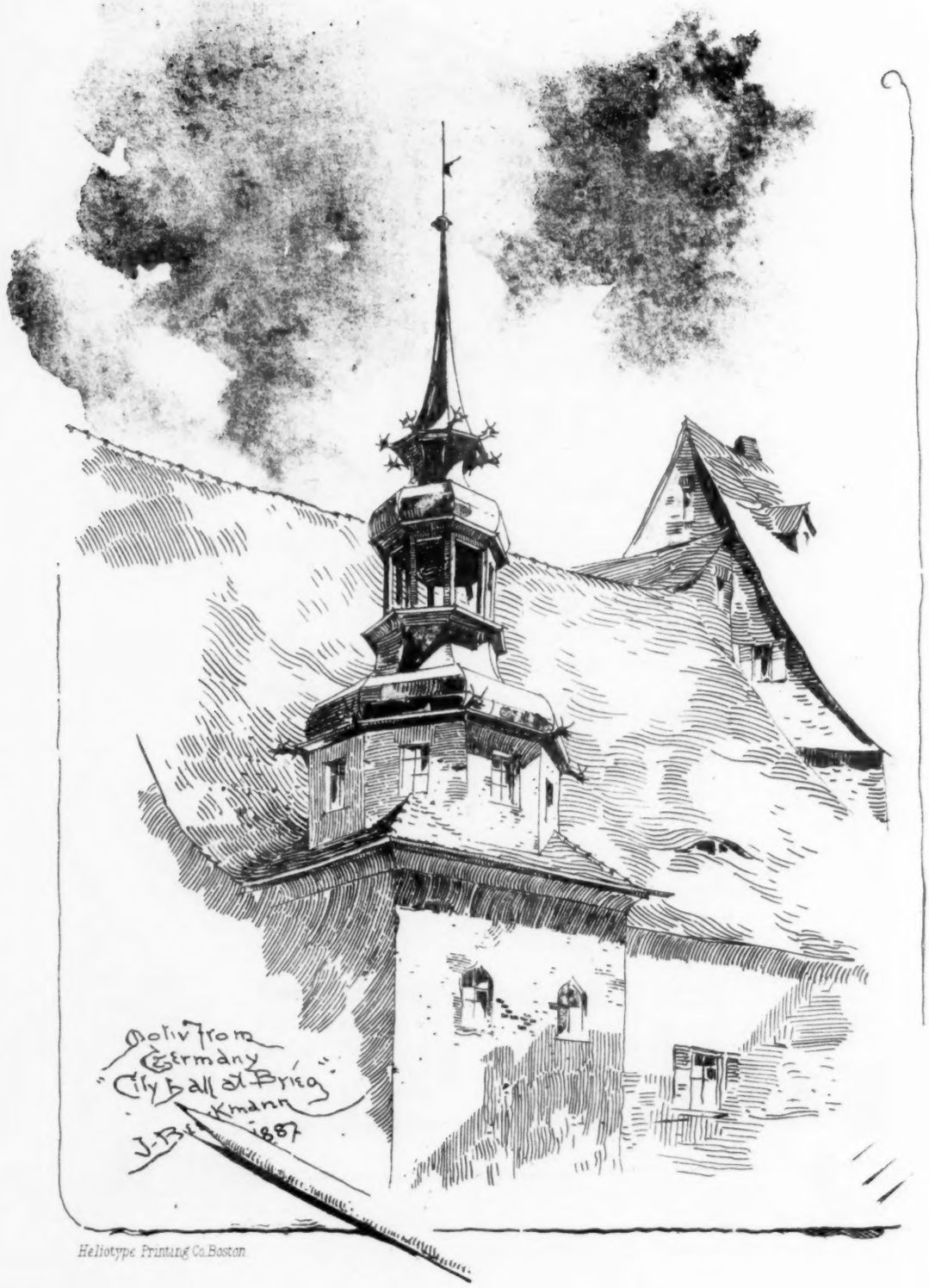

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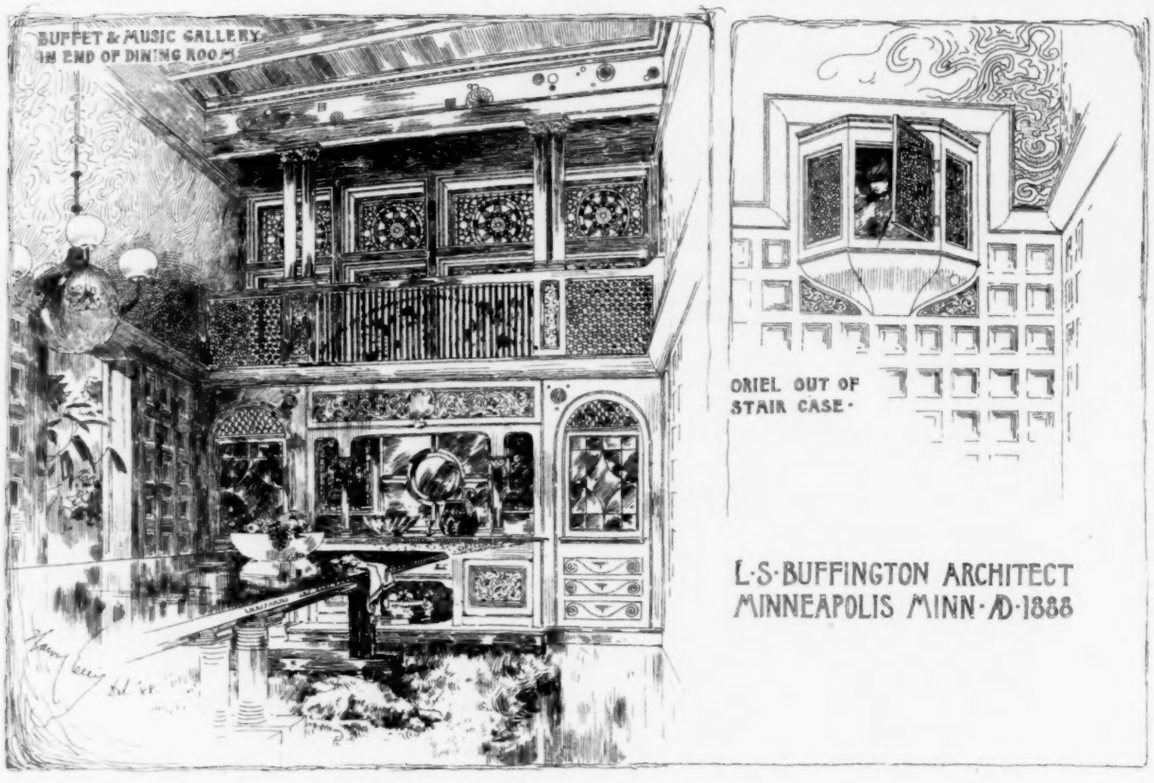

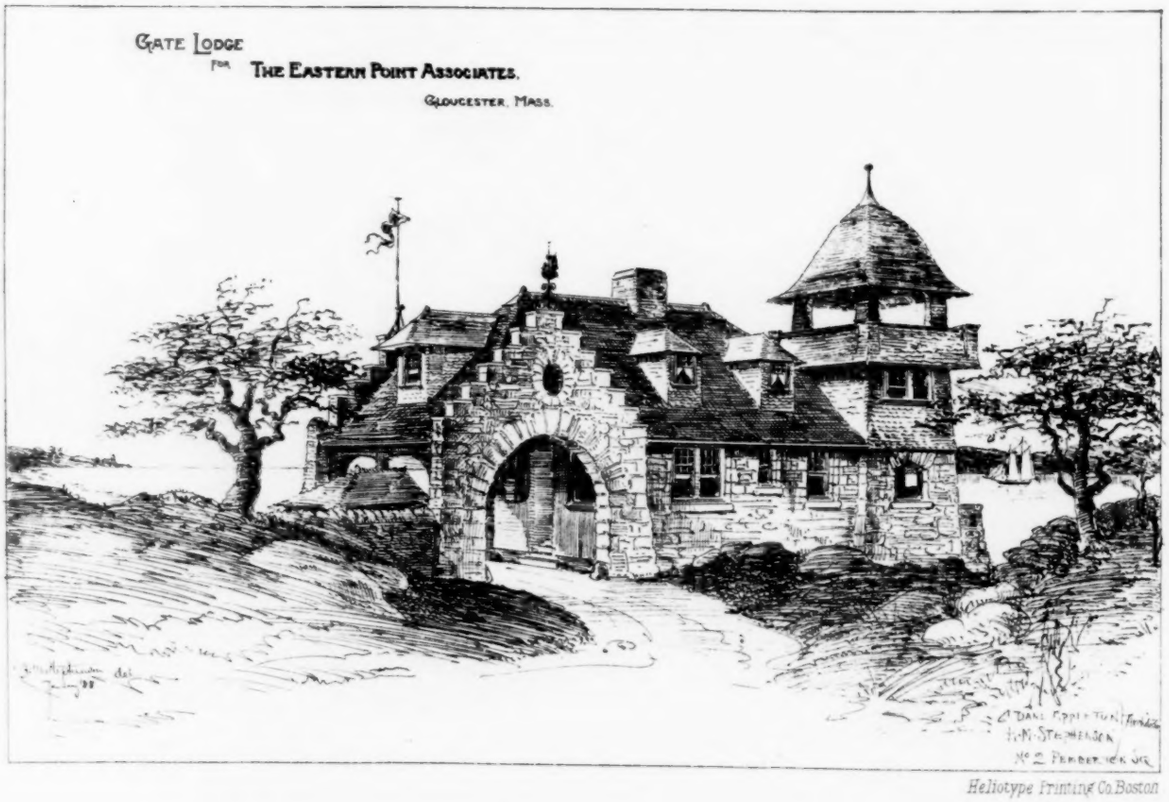

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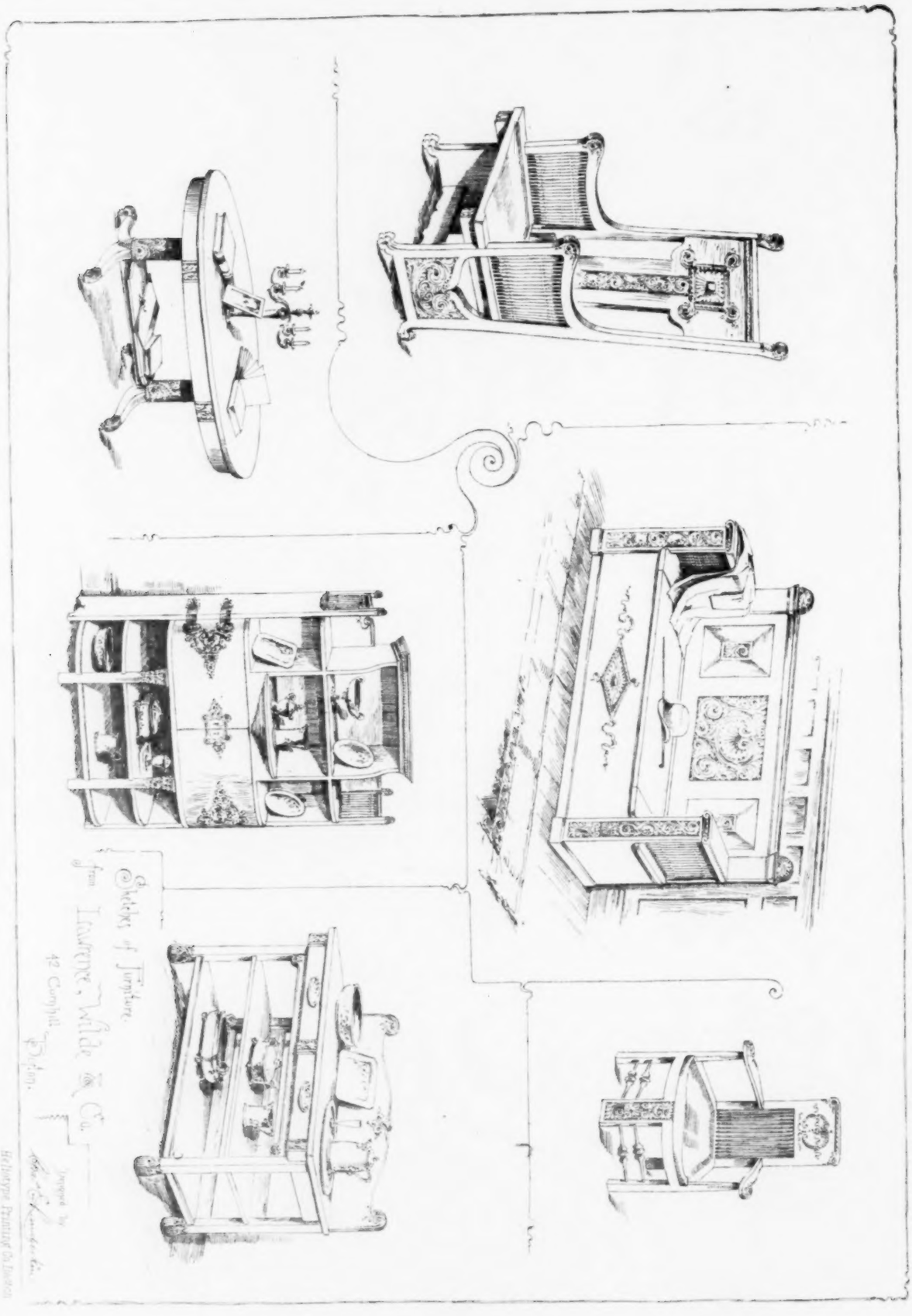

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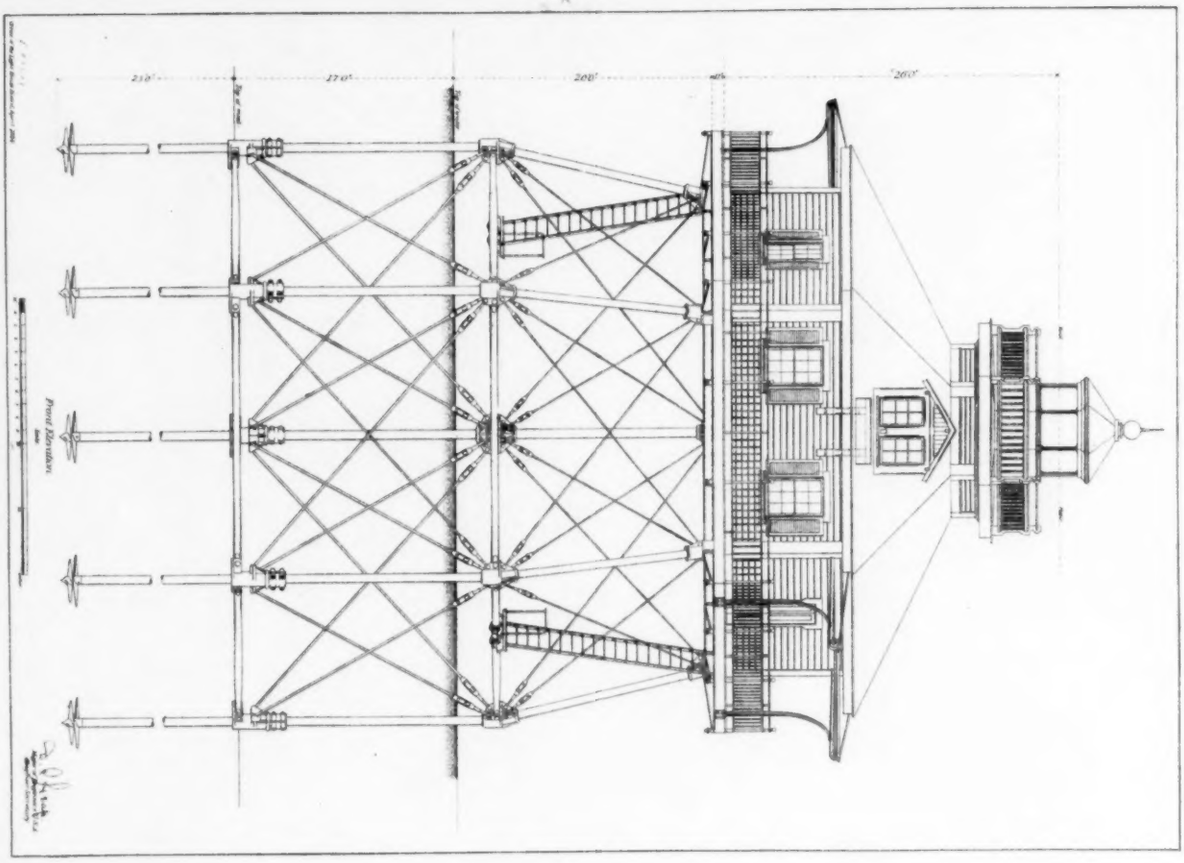

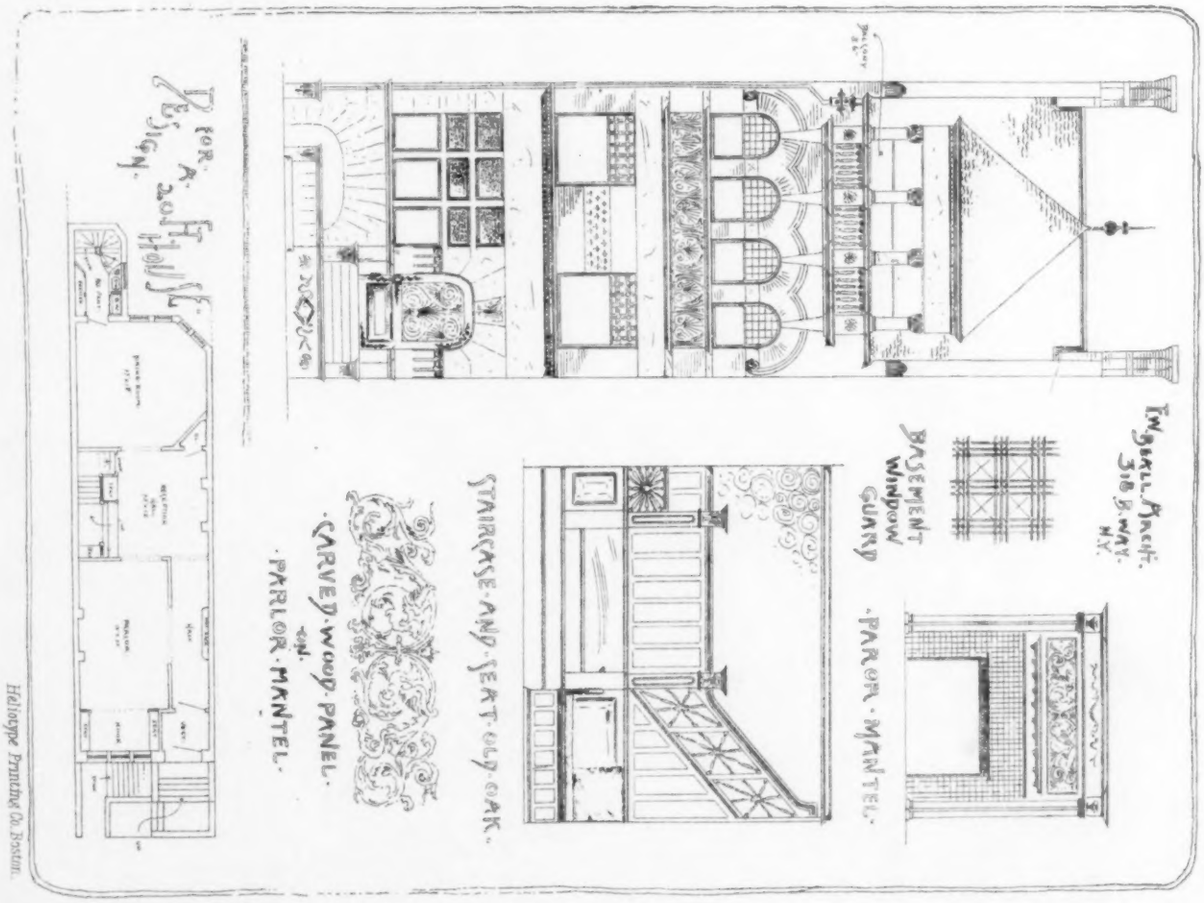

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